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INTERNATIONAL

JUNE 1952

VOLUME 27 • NUMBER 6

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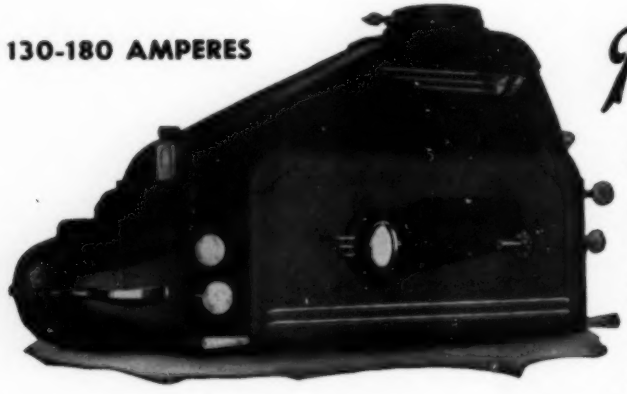

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Assures satisfying projection for Drive-Ins regardless of the size of the picture, length of throw, and under all weather conditions. . . . They are Und. Lab., Inc. listed and, therefore, not insurance hazards. . . . Heat filter assures no risk of film-heat damage at maximum arc amperage and maximum screen lumens.

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With Which Is Combined PROJECTION ENGINEERING

HENRY B. SELLWOOD, *Editor*

Volume 27 JUNE 1952 *Number* 6

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MONTHLY CHAT

16-MILLIMETER projection is growing up. In terms of employment and business opportunities offered to the professional projectionist the boy still is not quite as tall as his old daddy, but he sure is sprouting. In recognition of this sturdy growth and as a service we rightly owe our readers, IP begins this month, and will continue monthly hereafter, a department devoted specifically to 16-mm projection, its swiftly changing technology and rapidly expanding business aspects, and the status of the professional projectionist with respect to it.

In 16-mm we see a typical *radiation* (as biologists call it) of an established form. In the course of evolution, the experts say, some new form of life appears, establishes itself, and then *radiates* into a great number of variations and modifications. Our technique of motion pictures can be observed today radiating on the one hand into 16-mm and its growing opportunities, and on the other hand into that intricate art (which the SMPTE has been stressing so heavily the past few years) of slowing down motion by high speed photography coupled with low speed projection. And of course film, both 16-mm and 35-mm, is nowadays projected into TV camera tubes as well as onto theatre viewing screens. These very few novel species of motion picture technique could well represent only the barest beginning of a process of radiation that may branch out into regions too broad for even the imagination of a Jules Verne.

One of the pressures that induce radiation in living things is hard times; when the animal or plant finds difficulty in getting along, any variation into a new and less precarious field possesses premium survival value. The motion picture theatre and motion picture projection with it, do not at this moment enjoy exactly lush and prosperous times; and herein we see the mechanism of radiation at work, for at this moment one of the very best-known manufacturers of 35-mm motion picture projectors has leased out a large percentage of its facilities to a well-known 16-mm projector firm and is manufacturing 16-mm mechanisms for them. Times being somewhat less than hilariously prosperous in the 35-mm field—the organization radiated.

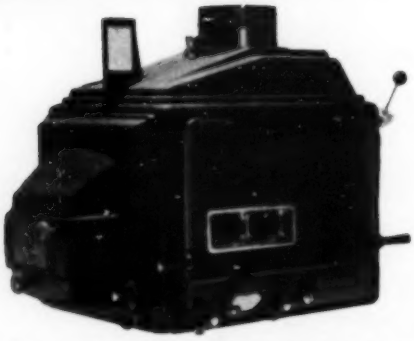
Similarly the projectionists who formerly worked in a 35-mm theatre and now run 16-mm projectors in a TV studio or operate their own personal 16-mm enterprises, or specialize on 16-mm showings in hotels and convention halls—have radiated.

No one expects the motion picture theatre to vanish; the worst of ultra-pessimistic predictions is that owing to TV and other causes it may come to occupy a less prominent place in the national life than hitherto. But there will always be a motion picture theatre. And always, above and around the theatre and occupying a far wider and more varied field, there will be motion picture projection.

How some theatres get brilliant pictures on the biggest screens:

It Doesn't Just Happen

THEY PLAN IT THAT WAY!



—and one of the things they do is install the

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"THERE'S A BRANCH NEAR YOU"

VOLUME XXVII JUNE 1952 NUMBER 6

Screen Types and Picture Brightness

By ROBERT A. MITCHELL

BECAUSE the theater screen is an inexpensive item compared with projection and sound equipment, seating, air-conditioning and heating units, etc., many exhibitors mistakenly regard its condition as a trifling matter, and fail to have it replaced until picture quality becomes so poor that patrons stay away.

Actually, the motion picture screen is an extremely important part of the projection and sound set-up, for the best photography and film-printing, the most lifelike color, the most powerful arcs, and the highest-quality projection lenses all together cannot overcome the deleterious effects of a screen which is in poor condition, or unsuited to the size and shape of the auditorium. Frequent inspection of the screen is recommended —but inspection followed by *action*. The theatre owner who can stay in business today is not the one who hides from his projectionists when the purchase of a screen is suggested. Neither can the projectionist expect to survive in his craft if he remains indifferent to the fact that the screen is not giving his presentations the most advantageous display possible. The screen surface can make or break the show.

Uniformity of Surface

A screen is primarily a reflector and diffuser of light. It should be a clear white, not brown or yellow or any other tint. The first consideration, however, is *uniformity of surface*, even though, as we shall shortly see, a special kind of non-uniform screen surface actually produces more even illumination.

If certain parts of the screen are darker or lighter than other parts, the projected picture will be spoiled. A non-uniform reflective surface can be caused by a poor resurfacing job or by streaks of dust and dirt. Dents, torn places, and visible seams also ruin pictures. Incorrect hanging and stretching of the screen may wrinkle the surface and produce light and dark streaks that look like dirt. It should always be kept in mind that dents and wrinkles too small to show up on white matte screens appear enormous on aluminum-surfaced "silver" screens. In fact, an aluminized screen must be stretched even flatter than the proverbial pancake before a satisfactory picture is obtained.

The first requisite for a perfectly flat screen is a sturdy stretching frame of good quality. The tension applied to the edges of the screen by the lacing cords should be perfectly even all the way around—otherwise the surface will be marred by wrinkles that look like the spokes of a wheel. It is always a good idea to go backstage at regular intervals for the purpose of checking the tightness of the screen. There are screen materials that require several stretchings during their period of service.

As all of us know, most H.I. arc-lamps produce a side-to-center distribution of screen illumination of from 60 to 80 per cent. This means that the central areas of the picture are perceptibly brighter than the sides and corners, especially when "illuminated surround" screen set-ups are used. An edge fadeaway of from 40 to 20 per cent is a bad thing in modern motion pictures because there is a definite trend to go easy on dollying shots, and to allow the action in certain scenes to roam all over the screen—even up or down into the very corners to produce novel effects.

The pictorial beauty and power of many Charles Chaplin productions is due in part to Mr. Chaplin's expert use of the stationary camera, as opposed to the restlessly roaming dolly, in certain types of scene. When the producer wishes to focus attention on the central areas of the picture he can do it by masking the camera lens in such a way as to produce a deliberate fadeaway framing of the picture. It used to be done often and effectively in the days before the movies found their voice.

In any case, this writer advocates even illumination of the entire screen surface, and opposes British and German protagonists of "hot-spot" projection.

At least one American screen manufacturer ingeniously mitigates the drawbacks of hot-spot screen illumination by perforating his screen only in the center (where the hot-spot occurs), and gradually tapering off the size of the perforations towards the sides of the screen. The wide *unperforated* side areas include from 50 to 75 per cent of the total screen area, depending upon the size of the screen.

Although this special screen is actually non-uniform in reflective power—the unperforated side areas reflecting about 8 per cent more light than the perforated center area through which the sound comes from the speakers—the effect of this carefully engineered non-uniformity is to produce a more uniformly illuminated picture.

Reflecting Power

The next requirement of screens to be considered is high *light-reflecting power*. All screens are to a certain extent "light eaters"; but when a screen reflects less than half the light falling upon it from the projectors, it eats up carbons and kilowatts, too. High-powered arcs and

modern large-diameter projection lenses go for naught if the screen either *absorbs* too much of the light or *transmits* too much to the rear wall of the stage.

The perforations of sound screens perforated over their entire surface decrease the reflectivity by from 8 to 10 per cent, the latter figure applying only to old-style screens which were perforated with rather large holes. This loss of light is not so serious as the attendant loss of pictorial detail in the picture. Smaller sound holes placed nearer together decrease the image-definition loss, but introduce sound difficulties due to the ease with which they become plugged up by dust deposited from air circulating through the screen.

Several attempts have been made to do away with the sound holes entirely by making screens from thin or lightweave materials. Thin solid screens are the best from the point of view of picture brightness and clarity, but it is necessary to compensate for the attenuation of the higher frequencies of sound by changing connections in the frequency-response network of the amplifier. This network is usually associated with the degenerative feedback circuit in modern amplifiers, and is conveniently tapped for ease in changing the frequency characteristics of the sound reproduction. Low frequencies—the bass notes of music and all the various rumblings and boomings of sound effects—are not appreciably impeded even by a thick canvas solid screen.

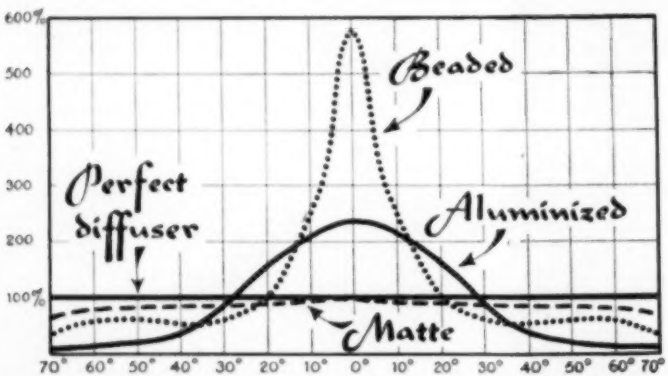
Woven materials, such as nylon cloth, allow free passage of the sound, but are ordinarily poorer reflectors than the usual types of perforated screen.

The ideal, or "perfect," screen has a reflectivity of 100%. That is to say, it reflects *all* of the light falling upon its surface, absorbing none and transmitting none. Unfortunately, the perfect screen exists only in the imagination. Although many commercial screens reflect even more than a 100% intensity of light through narrow angles (obtaining their super-brilliancy by robbing other viewing angles of light), no screen surfacing materials have been found which have a higher total reflectivity than 88 per cent—the reflectivity of a freshly shaved block of magnesium carbonate, a chalk-like substance.

Following is a list of the *diffuse reflectivities* of a number of white substances and motion-picture screen surfaces.

DIFFUSE REFLECTIVITIES

	Per Cent
Silver glass mirror	90
Magnesium carbonate	88
Magnesium oxide	86
Zinc oxide (zinc white)	82
Best solid coated canvas matte screen	80
Solid smooth plastic matte screen	80
Chalk (calcium carbonate)	80
Solid aluminized screen	76
White lead	75
Smooth white cardboard	75
Perforated smooth plastic matte screen	72
Best perforated canvas matte screen	72
White blotting paper	70
Perforated aluminized screen	68
White rag paper	65
Aluminum paint	65
Kalsomine	65
Fresh newsprint	55
Kalsomined cotton sheeting	55
Nylon cloth porous screen	50
Whitewash	50
Bleached closely woven linen	45
Solid beaded screen	45
Bleached cotton sheeting	40
Perforated beaded screen	37



Reflecting characteristics of screen surfaces. Angles of observation are indicated by the figures along the bottom of the chart; per cent reflectivity by the figures at the left. Note that the beaded screen has nearly 5 times the reflectivity of a matte screen at a viewing angle of 0 degrees, an observation angle frequently called "the normal."

A consideration of the directional characteristics of the light reflected by the white substances and screen surfaces listed above focuses attention on the third main requirement of a screen—*diffusibility*.

Diffusion of Light

A polished mirror, even though an excellent reflector of light, is worthless as a motion picture screen because it lacks the power to diffuse light. It reflects rays in directions which are completely dependent upon the directions of the rays before reflection, according to the simple geometric laws of optics. A practical projection screen must be a good *diffuser*, reflecting rays in all directions, and having little or no directional power beyond what is required in special cases.

In long, narrow theaters screens having directional characteristics in addition to diffusibility are desirable because they concentrate the light where it is most needed, e.g. on the long, narrow array of seats. Wide theatres, on the other hand, would experience difficulties with "specular" (mirror-like) screens because patrons seated outside the limits of a narrow viewing angle extending down the middle of the auditorium would see a very dim picture.

The two types of specular screens in wide use at the present time are the beaded and the aluminized screens. The resin type of specular reflecting surface familiar to everyone as Scotchlite advertising and traffic signs may also find application in specular screens.

When viewed from the center-line of the auditorium (viewing angle 0 degrees), the picture projected on a glass-beaded screen appears nearly 5 times brighter than it would on a matte (plain white) screen. If the observer moves to one side so that his viewing angle increases to 22 degrees to the normal, the picture will seem to be just as bright as one on a matte screen. At a greater viewing angle, however, the picture appears considerably darker.

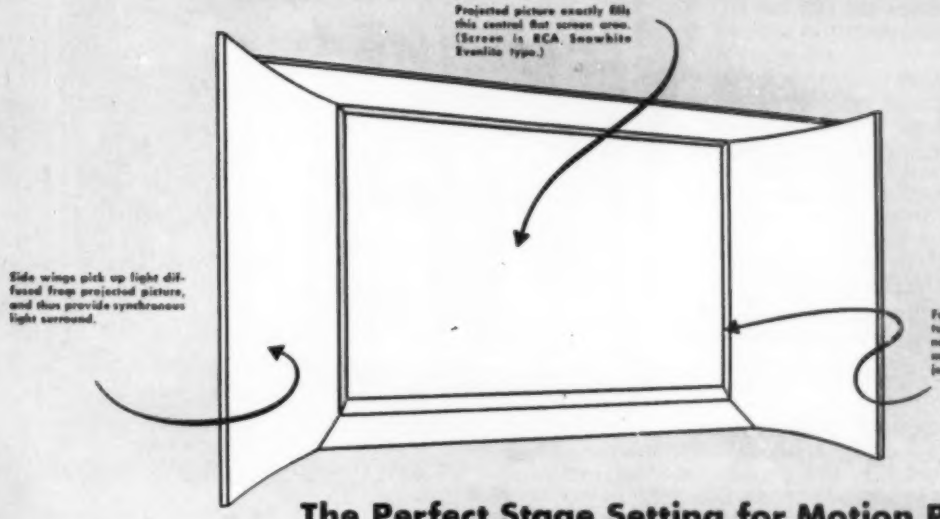
The beaded screen consists of a cloth-backed white plastic material in which a single layer of glass beads, each bead 0.011 inch in diameter, is imbedded.

The aluminized screen is an ordinary screen coated with high-brilliancy aluminum paint. When viewed at an angle of 0 degrees it appears only little more than twice as bright as a plain matte screen under similar projection conditions. At an angle of 30 degrees to the normal the picture looks to be about as bright as it would be on a matte screen. At greater angles the picture on the aluminized screen is much too faint to be viewed with comfort.

Aluminized screens have another seri-

(*Continued on page* 33)

Announcing...RCA's new Synchro-Screen


Projected picture exactly fills this central flat screen area. (Screen is RCA Snowhite Everlite type.)
Side wings pick up light diffused from projected picture, and thus provide synchronous light surround.
Fuzzy edges of projected picture are trimmed off by these narrow areas, which are almost perpendicular to projected light.

The Perfect Stage Setting for Motion Pictures

Read what patrons say:

- **"Softer picture"**
- **"Easier on the eyes"**
- **"Picture looks bigger"**
- **"Better color"**
- **"Old black masking seemed morbid; this new screen seems more cheerful."**

New maskless screen fits most theatres . . . surrounds picture with frame of synchronized light effects . . . adds new beauty and realism . . . reduces eye-strain and fatigue.

TYPICAL COMMENTS from typical theatre patrons seeing the RCA Synchro-Screen for the first time . . . at the Plaza in New York City, at the Plaza in Scarsdale, N. Y. . . . at the Cinema in Framingham, Mass. Right from the start people have been almost unanimous in their enthusiastic approval.

How RCA Synchro-Screen works

Instead of traditional black masking, RCA Synchro-Screen is surrounded with side, top and bottom wings of RCA snowhite vinyl plastic* unperforated screen material, assembled so that projected picture just fills flat screen area. Diffused light from picture is picked up by surrounding wings; thus picture is always framed with light effects which vary in brilliance and color in exact synchronization with portion of picture adjacent to each portion of wing. The surrounding area thus produces a reflected luminous extension of the projected light.

Picture seems larger

Synchro-Screen has effect of extending picture beyond limits of flat screen and out onto broad wings . . . makes picture seem larger, less confined. Particularly effective with color film because wings pick up not only intensity of picture light but also color. Results are truly beautiful.

Synchro-Screen package fits most theatres

Now available in standard screen sizes from maximum picture width of 12 feet to 25 feet. Screen and wings are "packaged" for easy assembly. Specially constructed wood frames for the wings are easy to erect. Entire Synchro-Screen stage setting costs surprisingly little . . . well within reach of any theatre.

Get full story . . . call your RCA Dealer—NOW

Look into RCA's new Synchro-Screen for *your* theatre. Your own friendly RCA Theatre Equipment Dealer has full information. Call him . . . now. Let him show you how to put this beautiful new kind of maskless screen to work for you in your theatre . . . how you can start winning new patrons . . right now.

*The RCA Synchro-Screen employs Firestone Vitec of RCA specification.

RCA

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I am interested in your new RCA Synchro-Screen. Please have your RCA Theatre Equipment Dealer call on me and tell me how this screen might be installed in my theatre.

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"BLACK MARIAS"

LIGHTED THE INFANT FILM INDUSTRY BY LITERALLY FOLLOWING THE SUN. NAMED AFTER AN ORIGINAL **EDISON** DESIGN BUILT IN 1893, THIS REVOLVING STUDIO PROVIDED A SHED FOR THE CAMERA, AND METAL FRAMES, TO WHICH SCENERY WAS ATTACHED.

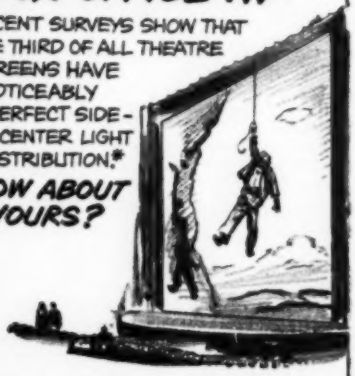
BRILLIANT, CONTROLLABLE WHITE LIGHT

OF "NATIONAL" CARBON ARCS BROUGHT VIRTUAL EMANCIPATION FROM THE SUN FOR STUDIO LIGHTING. WHOLE MINIATURE CITIES LIKE THIS SET FOR **UNIVERSAL'S "BROADWAY"** (1929) WERE LIGHTED BY "NATIONAL" CARBON ARCS.

BOX OFFICE TIP

RECENT SURVEYS SHOW THAT ONE THIRD OF ALL THEATRE SCREENS HAVE NOTICEABLY IMPERFECT SIDE-TO-CENTER LIGHT DISTRIBUTION.*

HOW ABOUT YOURS?



*Report on Screen Brightness Committee Theatre Survey, Journal SMPTE, September, 1951.

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The Importance of the "Men Upstairs"

TECHNICOLOR'S APPEAL ENHANCED BY SKILL OF PROJECTIONIST

By LeROY CHADBOURNE

PROPER screening of Technicolor prints is a prerequisite to their translation in full scope of beauty to the eyes of the audience. The effort and expense the producer undertakes in turning out a Technicolor picture depends for final optimum results on the skill and care of the projectionist. All that has gone on before the print reaches him is at the mercy of his knowledge of his craft and his ability and willingness to apply that knowledge properly.

The importance of Technicolor as a means of bringing revenue into the theater box office has been proved over and over again. Trade reports have repeatedly pointed up the fact that a picture in Technicolor has in its favor a box office factor which more often than not determines the strength of its appeal to the public and consequently the revenue of the theater.

But the ultimate value of this Technicolor picture lies inescapably in the hands of the projectionist, who can either extract and lay before the audience the whole value that the producer and laboratory put into the print or can mar and spoil it.

Focusing

Correct focus is the most important factor in optimum presentation of Technicolor and needs continually renewed attention. Cleanliness of the entire optical system, and of the screen, are more important than in black-and-white projection. So is correct film alignment; so is correct screen illumination. On the other hand, there is no difference whatever between Technicolor and black-and-white prints so far as storing, cleaning, and handling procedures are concerned. There is no difference in the splicing methods.

The projector lens that was properly focused for black-and-white will be found not in the best position for a Technicolor print. Moreover, when Technicolor is run the focus should be re-checked at the beginning of each reel. An opera glass or similar instrument is suggested as helpful in producing a precise focus because of the distance between projection room ports and the viewing screen.

The necessity for realignment of focus when Technicolor and black-and-white are alternated lies in the fact that there is no silver in the film image of a Technicolor print, only dyes. On the other hand, the silver always present in black-and-white film causes a difference in the heat absorption between it and Technicolor print. Therefore, each assumes a different position before the aperture, hence the lens must be refocused accordingly.

Whether Technicolor or black-and-white, the focus is optimum when it brings out the grain pattern of the image. When he has done this, the projectionist need not concern himself too much with diffusion if any exists; he should remember that the cinematographer may have decided that the object shown does not qualify for maximum delineation by the camera. For example, an aged thespian (makeup experts notwithstanding) may be accorded consideration by the photographer, and the projectionist who helps such illusion by focusing for grain structure and not image structure shares and abets the responsibility of the cameraman.

Cleanliness and Brightness

Cleanliness is more urgent in the case of Technicolor than of black-and-white because of the greater importance of eye-appeal in the case of the former. The print is cleaned like any other, by carefully rewinding it through a soft, clean cloth pad moistened with carbon tetrachloride. The whole projection optical system, including the aperture, and not forgetting the glass (if any) in the projection ports, should be maintained in immaculate condition. The projectionist cannot clean or replace the screen, but he can call attention of the management to any faults in its condition that detract from the value management paid for when renting a Technicolor film.

Again, the fact that eye-appeal is of greater importance in Technicolor than in black-and-white increases the importance of checking both the cleanliness of the film path and its general condition in every component, and the correctness of threading. Scratches in a Technicolor print are more important than in black-and white in the same sense that a visible flaw in a real diamond may be regarded as more important than one in costume jewelry.

In black-and-white sheer eye-appeal is more subordinate to story, cast, and sound; in Technicolor appearance as

(*Continued on page* 27)

EDISON'S FIRST MOVIE VIEWER

Endless film was driven through this Kinetoscope at about 40 frames per second. *E* is the lens; *S* and *R* the film passing under the lens; *V*, beneath the film, is the whirling slotted disc that acted as a shutter; and *L*, under *V*, the light. The device mounted in the left upper panel would appear to be a coin-slot and mechanism.

Transmission Beyond the Horizon at 40-4000 Mc*

ONE of the commonest assumptions in radio theory has been challenged as the result of a series of experiments conducted by the Laboratories during the past few years. These experiments have indicated that the very high and super high radio frequencies, such as those used for television, radar and microwave relay systems, are not necessarily limited to approximately line of sight distances, but that signals can consistently be obtained at distances of 200 miles or more beyond the horizon.

Lower frequencies, reflected between the ionosphere and the earth's surface, can carry signals hundreds and thousands of miles beyond the horizon. Very high frequencies, on the other hand, are not ordinarily reflected by the ionosphere but continue through it, merely undergoing some refraction as they pass through atmospheric areas of varying density. Thus, the natural tendency throughout radio history has been to assume that, in general, the higher frequencies would not be useful for transmission much beyond the horizon.

Observations Disprove Theory

Scientists from Bell Telephone Labs., compiling the results of their observations, have reported that VHF signals have consistently demonstrated far greater strength at points beyond the horizon than had been expected from existing knowledge of very high frequency radio signals. The loss of power in going from within the horizon to slightly beyond is, as was expected, considerable, but accepting this loss, VHF signals were shown to decrease much more slowly with increasing distance than was predicted by existing theories.

In the series of experiments carried on by the Laboratories, the median signal levels recorded are 50 to 90 db below the intensity expected in free space but are hundreds of decibels in excess of the computed value based on the classical theory of smooth spherical earth with a standard atmosphere.

"Ducts" and "Scattering" Ruled Out

Reception of high frequency signals far beyond the horizon had been reported occasionally by previous investigators but dismissed as an irregular and undependable phenomenon. Such reception was assumed by some to be due to unusual weather conditions bringing about the presence of large volumes or "ducts" in the atmosphere having a markedly different density than the surrounding atmosphere, hence, a different refractive value. A later theory was that the normal turbulence in the atmosphere was sufficient to scatter the signal over relatively wide areas.

However, the median signal levels recorded by scientists of the Laboratories are relatively independent of meteorological conditions, indicating that the over-all reliability is much greater than would be expected from the "duct" theory. In addition, the experimental evidence on the effectiveness of directional antennas is contrary to what would be expected from the "scattering" theory.

Frequency, Weather, Don't Count

A most significant conclusion to be derived from the tests by the Laboratories relative to free-space-transmission is that the received power is substantially independent of frequency, antenna height, and weather effects at points beyond the horizon. These factors have a substantial effect at or near the horizon but their importance decreases gradually with increasing distance.

The decrease in signal power in going from within the horizon to slightly beyond is greater at frequencies in the thousands of megacycles (SHF) than it is at 100 mc (VHF), but once this loss is accepted the signal decreases much more slowly with increasing distance than the extremely rapid decrease predicted by the classical smooth earth theory.

22 to 285 Miles, 3700 Mc

In tests at 3700 mc, made in the Spring of 1950, an experimental transmitter at Whippany, New Jersey, generated 1.5 micro-second pulses with a peak power of about 300 kw. This energy was fed through 250 feet of wave guide to a 10-foot paraboloid antenna mounted on top of a 150-foot tower. The receiving antenna was a 57-inch "dish" mounted on top of the truck that carried the receiving and recording apparatus.

Measurements consisted in recording the received signal from several days to a week at each of eight general locations from 22 to 285 miles northeast of the transmitter. These sites were on high ground relative to the local terrain but were all beyond the optical line-of-sight. The most distant site was at Mt. Washington, N. H., where, in spite of the natural elevation, the optical line-of-sight from the transmitter was nearly eight miles above the receiving antenna.

125 to 325 Miles, 534.75 Mc

A second series of tests during the same year made use of the 534.75-mc sound channel of an experimental television transmitter operated by National Broadcasting Co. at Bridgeport, Conn. These measurements lasted from several hours to several days at most of the receiving sites previously used for the 3700-mc test. The longest path was about 325 miles to a point near Bar Harbor, Me., half over land and half over water.

Other paths tested included a 225-mile path entirely over land to Mt. Washington, and a 125-mile path almost entirely over sea water to Gay Head on Martha's Vineyard.

183 Miles, 459.8 Mc

As a result of the tests in New England on 535 and 2700 megacycles, a 1-kw transmitter operating at 459.8 megacycles was set up at Holmdel, N. J. Two principal receiving sites were selected along the microwave relay route between New York and Chicago, one near Chambersburg, Pa., (183 miles) and the other in Pittsburgh.

A series of tests on antenna beam widths and gain were conducted on the 183-mile path to Chambersburg. These tests indicated that the signals were coming from the horizon along the great circle route, and that the antenna beam widths were not widened by more than 1 or 2 degrees in either azimuth or elevation, indicating the effectiveness of directional antennas for beyond-horizon reception.

A paper giving some of the results of the Laboratories' studies and summarizing data from other published reports was presented by Kenneth Bullington at the annual convention of the I.R.E. last March and will be published in the Proceedings.

* Bell Labs. Record, June, 1952

NPA Eases Theatre Bans

National Production Authority's action in easing previous restrictions on use of metals by the motion picture industry has been interpreted for the industry in detail by Fred C. Matthews, who is Chairman of the Federal Legislation Committee of the Theatre Equipment and Supply Manufacturers Association as well as President of Motiograph, Inc.

According to Matthews, the new relaxation in order M4-A, effective as of July 1, 1952, permits:

Relocation of projection rooms.

Installation of stage rigging and curtain controls.

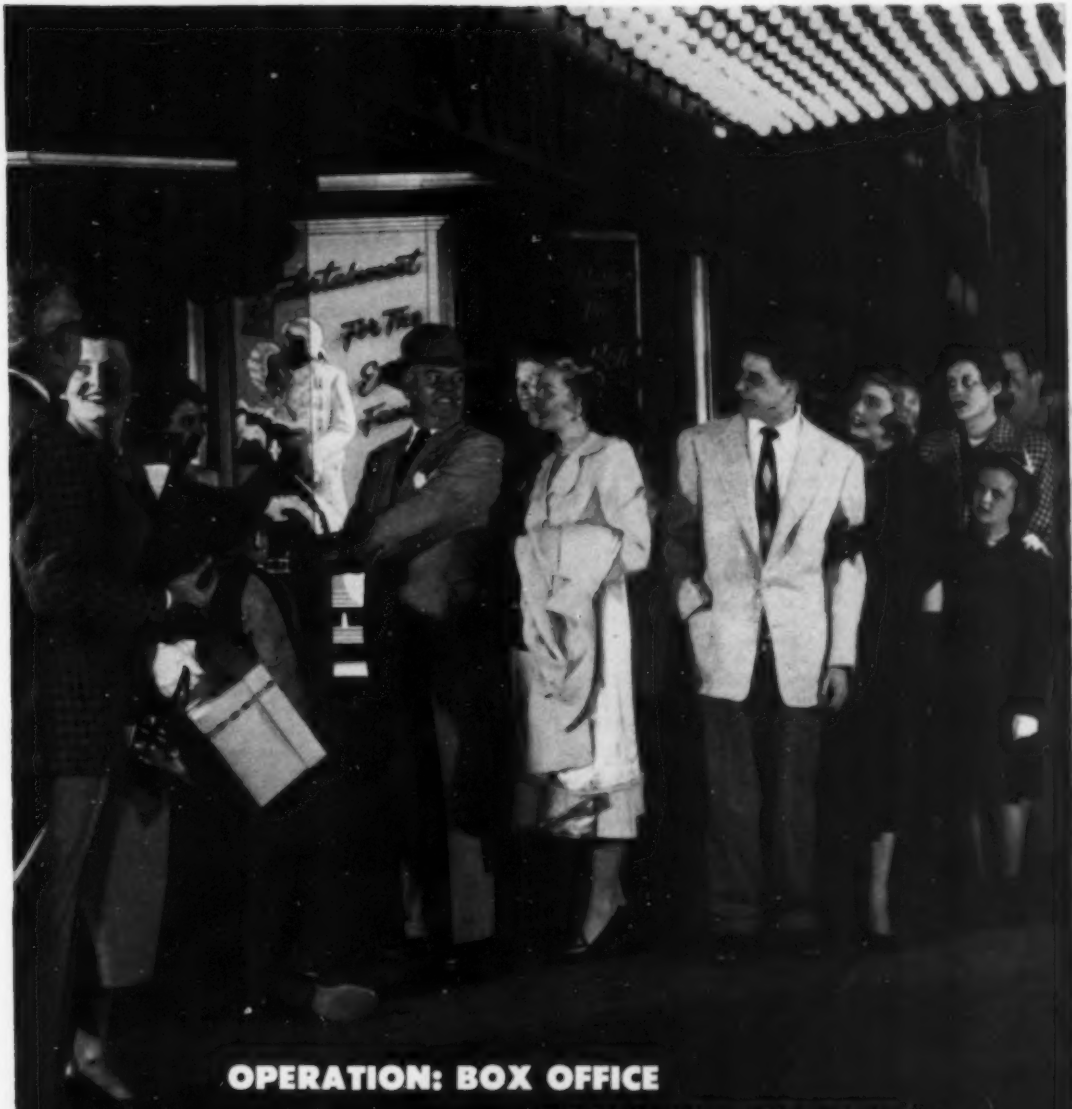
Installation of air conditioning.

Installation of new marquees, if aluminum used in them is limited.

"Just about any remodeling job."

"Complete theatres could be built if laminated wood construction was used, since the 5 tons of steel per quarter (now permitted) should permit enough steel for trusses, reinforcements, etc."

These and other interpretations of the recent relaxation of controls (all of which Matthews checked with the Chicago office of the Department of Commerce) have been announced through the official organ of TESMA, the *Tattler*.



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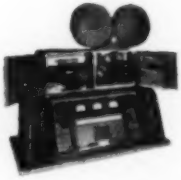

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Inspection, Splicing and Care of Film

These notes are condensed from advisory comment prepared by Eastman Kodak for film exchanges; they apply just as emphatically to theatres.

II.

SOME inspectors, fearful of obtaining badly wound rolls, bind film so tightly against the reel flange that the entire surface of the film is in contact. This results in slightly curved, diagonal abrasions across the film as shown in Figure 8. This type of damage, however, should not be confused with the short, horizontal scratches extending straight across the film and perpendicular to the length of the film. These fine scratches give rise to a pronounced crackling noise in the speaker system during projection. They may be on either side of the film and are usually caused by contact of the film with the floor, where gritty particles may be picked up and carried into the roll. Cross abrasion, such as illustrated in Figure 9, then occurs if the affected sections of the roll shift from side to side during shipment.

Cinch Marks and "S" Bends

Release print film which has become oily from passage through projectors has a tendency to lock rather than slip during rewinding. As a result, inspectors often find it necessary to rewind a roll two or three times in order to obtain proper winding.

Loose winding is, of course, to be avoided, because it encourages surface abrasion. It is still common practice to attempt to tighten a loosely wound roll by pulling on the outer lap of film. This should be avoided by all means, since both sides of the film will then show cinch marks or short lengthwise scratches. There is also the added danger of developing kinks or "S" bends in the roll (see Figure 10) which, if not straightened or removed, can cause considerable trouble in the projector.

Splicing

Buckled or bumpy splices such as illustrated in Figure 11 result from excessive scraping, which weakens the base, and too liberal application of cement. Excess cement not only distorts the weakened area when it has dried but squeezes out under pressure and attacks the base at either side of the splice, thereby increasing the possibility of distortion. On the other hand, the applicator used must be capable of carrying sufficient cement so as to completely cover the scraped area in one stroke.

The small bench-top splicer is the type most widely used in both the film exchange and theater. The pressure springs on this type splicer should be kept free of hardened cement and scrapings, and the springs should be kept properly spaced to insure satisfactory contact across the full length and width of the splice. The scraping blade should be kept sharp in order that it will remove the binder coating as well as the emulsion, since this is necessary to obtain a good splice.

Scraping blades are often kept in service long after they have become ineffective in their ability to remove the binder. During the scraping operation, contact with the metal bar tends to dull the blade. It is necessary therefore, to change the position of the blade in the holder frequently, or to replace it, so as to have the best possible working edge. Safety razor blades are very efficient in their scraping action but they can easily score

FIGURE 8

Curved diagonal abrasions caused by contact of back surface of film with reel flange during rewinding.

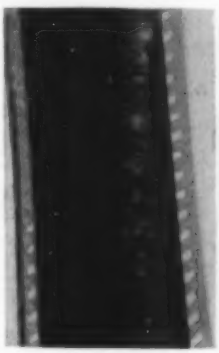

FIGURE 9.

Cross abrasions caused by gritty particles wound into the roll. Abrasions run across film because of sidewise movement of roll during shipment.

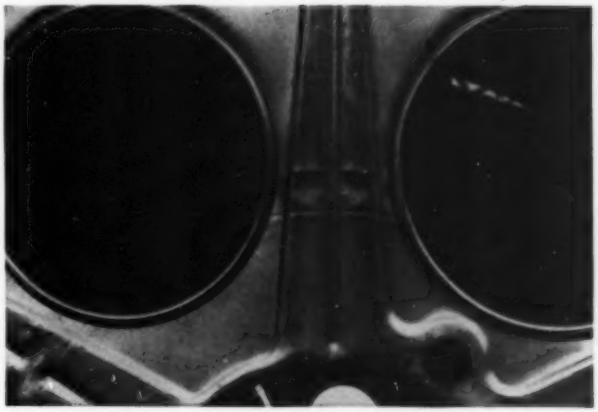

FIG. 10. Film kinks created when loosely-wound roll is tightened by pulling on outer flap of film.

FIGURE 11.

Buckled splices caused by excessive scraping and excessive quantities of cement.

the base and are therefore not recommended.

Sandpaper or emery cloth, while admittedly very effective, should not be used for scraping, because the grit particles will be picked up by oily film and carried into the roll. Such particles not only cause serious surface abrasion, but may also find their way into projector bearings.

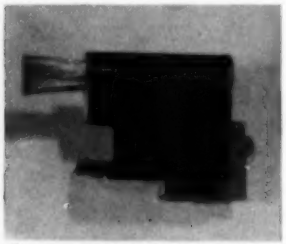

FIG. 12. Fine wire brush for bench-top splicers, available through supply houses.

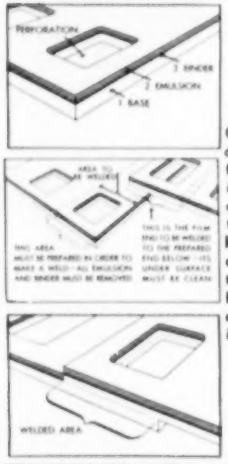

FIGURE 13. Good splicing demands effective scraping. Both the emulsion and the layer that binds the emulsion to the base must be scraped away, exposing the base for welding.

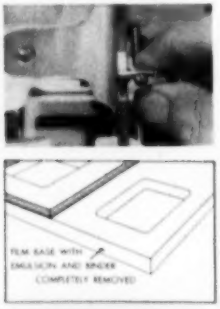

FIGURE 14. Scraping properly done, as above, prepares the surface to be welded, as shown center and below.

The fine wire brush (Figure 12) has proved very helpful. This device may be ordered through theater supply houses. A few sweeping strokes of this brush, after scraping, will give the desired dull surface even though the blade has not been too effective. The proper use of this brush is illustrated in a leaflet furnished by the manufacturer with each unit.

Satisfactory splices demand careful scraping, which means *complete* removal of the emulsion and binder coatings. On certain types of color films where these coatings are on both sides of the film, scraping of each of the surfaces to be joined is required. In all cases, the surfaces to be joined should be thoroughly clean. If the back surface contains only a slight film of oil, some difficulty may be encountered in obtaining successful splices. Sometimes this factor is overlooked and poor splices are mistakenly attributed to the particular cement used, the splicing equipment, or to the film base itself.

Occasionally, it is found helpful to roughen the back surface slightly where certain films seem to resist satisfactory splicing. Another effective technique is to apply a very small amount of cement to the back surface and to wipe it off immediately. This acts as a primer coating preliminary to the actual splicing operation, and aids in obtaining thorough adhesion of the two surfaces to be joined.

The proper type of cement must be used and care should be taken to avoid a great excess. Use just enough to cover the entire area of the scraped surface. It is important to allow sufficient holding time under equalized pressure. For safety film, about 10 to 15 seconds is recommended. At the end of the bonding time, the pressure may be released and the finished splice rubbed slightly with a cloth (across the film; never in a direction parallel to the length of the film) in order to help seal the cut ends.

A good splice is actually a weld, one section of the film being partly dissolved into the other. It should be emphasized that it is important to bring the two surfaces under pressure as quickly as possible after application of the cement. It is undersirable, however, to slam the pressure clamp into position since this results in splashing of the cement. If the left clamp of the bench-top splicer is raised slightly when the cement is applied, a cleaner back surface will be obtained, since the cement will be less apt to flow under the film. This will greatly reduce the possibility of distortion in the spliced area when the cement has dried.

Some exchanges use one type of cement for nitrate film and another type for safety film. This practice has proved troublesome on numerous occasions. Cements are now available which will splice both kinds equally well if instructions are fol-

(*Continued on page 28*)

FIGURE 15. The weld must be clamped promptly and kept clamped for sufficient time. Good contact provided by well-adjusted equipment holds the films together evenly.

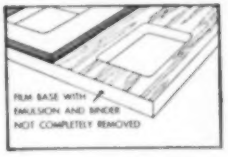

FIGURE 16. Incomplete scraping.

FIGURE 17. Off-center pressure

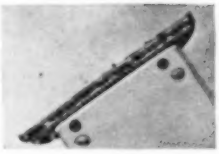

FIGURE 18. Fouled springs

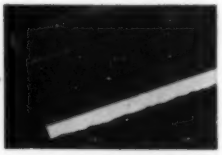

FIGURE 19. Nicked razor blade

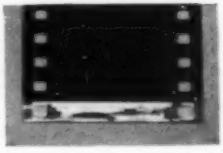

FIGURE 20. Incomplete scraping

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Standards Promote Better Projection

Standards are indispensable to the motion picture industry. Herewith is continued IP's presentation of accepted 35-mm projection and sound standards.

II

EVERY 35-mm film, regardless of the studio of origin or manufacturer of the film stock, can be run on motion picture projectors of all makes and types. This is so because both film and projectors conform to accepted standards. All soundtracks, regardless of studio of origin, will today produce sound of standard quality in all theaters when the reproducing equipment has been suitably "tuned."

This was not the case before studio and theater standards had been commonly accepted; and, therefore, in the early days of sound it was made a violation of contract to play "unauthorized" recordings on standard theater equipment or accepted recordings on "unauthorized" equipment.

Today, standards are proposed (after due study) by the Motion Picture Research Council or by the Society of Motion Picture and Television Engineers and submitted for official acceptance to the American Standards Association. Further study follows; also perhaps conferences among those respective organizations; very likely modification of the original suggestion; and eventually the standard may be promulgated not as "official" but only as "proposed." If no serious objections are found or brought forward after a reasonable period of time the proposed standard is ultimately elevated to the status of official.

The *system* of standards, as a system, is useful to all in the industry even in cases where specific standards have never been created. For example, today any 35-mm mechanism can be mounted on any 35-mm soundhead, and the soundhead in turn on any pedestal—the manufacturers on their own account have standardized such details because that is a natural thing to do in an industry where standards are commonly used and universally accepted. In an industry that had no system of standards competitors would perhaps think it a strange thing to build their merchandise for interchangeability with their rivals'.

The accepted standards reproduced here (and in IP for May, 1952) are those that are of direct and immediate interest to projectionists engaged in 35-mm work; standards relating to 16-mm projection will be presented in future issues. Standards not of direct interest to projectionists (such as those referring, for example, to dimensions and perforations of film) will not be presented in these pages. IP gratefully acknowledges the courtesy of the ASA and of the SMPTE in authorizing these reproductions.

Emulsion and Sound Record Positions for 35-mm Film (Z22.3-1946)

1. Emulsion Position

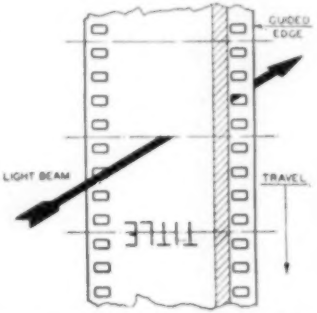
1.1 The emulsion position in the projector shall be toward the light-source except for special processes.

2. Speed of Projection

2.1 The speed of projection shall be 24 frames per second.

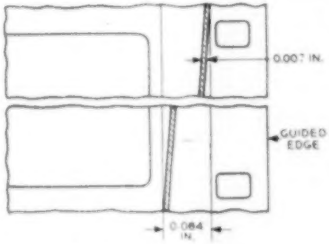
3. Distance Between Picture and Sound

3.1 The distance between the center of the picture and the corresponding sound shall be 20 frames.



Drawing shows film as seen from the light-source of the projector.

Scanning-Beam Uniformity Test Film for 35-mm Sound—Service Type (Z22.65-1948)



1. Scope and Purpose

1.1 This standard describes a film which may be used for determining the uniformity of scanning-beam illumination in 35-millimeter motion picture sound reproducers. The recorded sound track shall be suitable for use in the routine maintenance and servicing of the equipment.

2. Test Film

2.1 The film shall be a print from an original negative. It shall consist of a 1000-cycle, variable-area recording at full modulation of the 0.007-inch width and shall be approximately sinusoidal. The track shall move uniformly 0.077 inch from one edge of the scanned area to the other as shown below.

2.2 The scanned area shall comply with American Standard Sound Record and Scanned Area, Z22.40-1946, and the film stock used shall be cut and perforated in accordance with American Standard Cutting and Perforating Dimensions for 35-Millimeter Motion Picture Positive Raw Stock, Z22.36-1947, or any subsequent revisions thereof.

2.3 The length of this film shall be approximately 8 feet.

1000-Cycle Balancing Test Film (Z22.67-1948)

1. Scope and Purpose

1.1 This standard describes a film which may be used for balancing the respective power-level output from two or more 35-millimeter motion picture sound reproducers.

2. Test Film

2.1 The film shall be a print from an original negative containing a 1000-cycle, variable-area track recorded at 50-percent modulation. It shall be accompanied by a statement of the percent modulation of the incident light in the reproducer. The accuracy of calibration shall be within ±1 decibel.

2.2 The harmonic distortion of the recorded 1000-cycle note shall not exceed 2 percent.

2.3 The sound track shall comply with American Standard Sound Record and Scanned Area, Z22.40-1946, and the film stock used shall be cut and perforated in accordance with American Standard Cutting and Perforating Dimensions for 35-Millimeter Motion Picture Positive Raw Stock, Z22.36-1947, or any subsequent revisions thereof.

3. Instructions

3.1 An instruction sheet, describing the manner in which this film is to be used in various types of reproducing equipment, shall be provided with each film.

Sound Focusing Test Film (Service Type) (Z22.61-1949)

1. Scope and Purpose

1.1 This standard describes a film which may be used for focusing the optical systems in 35-millimeter motion picture sound reproducers. The recorded fre-

quency shall be suitable for use in the routine maintenance and servicing of the equipment.

2. Test Film

2.1 The film shall be a print from an original negative and shall contain a 7000-cycle, sinusoidal, variable-area or variable-density track recorded at 1 decibel below 100-percent modulation. The variation in power output level from the film shall be not more than ±0.25 decibel.

2.2 The sound track shall comply with American Standard Sound Record and Scanned Area, Z22.40-1946, and the film stock used shall be cut and perforated in accordance with American Standard Cutting and Perforating Dimensions for 35-Millimeter Motion Picture Raw Stock, Z22.36-1947, or any subsequent revision thereof.

Dimensions for Mounting Frames for Theater Projection Screens (Z22.78-1950)

1. Scope and Purpose

1.1 This standard specifies dimensions for the mounting frames used for supporting motion picture theater projection screens.

2. Frame Size

2.1 Sizes of frames shall be in accordance with the table below.

2.2 The frame size shall be measured from the inner edge of one side to the inner edge of the opposite side.

2.3 Frames for use with screens of less than 12 feet x 16 feet require 3½ in. minimum clearance on each of the four sides with the minimum clearance increasing as indicated for the larger sizes.

3. Hooks

3.1 Suitable lacing hooks shall be provided on the inner edges of the frames. These hooks shall be spaced on 6½ in. centers starting at points 3 in. on either side of the center of the four sides of the frame.

Appendix

Projection screens for motion picture theaters are supplied in a variety of materials each of which has its own physical properties. One of these properties is the amount a screen of a given size will stretch after it is laced into a frame. For this reason it may be desired to provide mounting frames with more clearance than that specified in the table. The inside frame dimensions are specified as the minimum dimensions which will give a satisfactory installation when used with an average screen of the corresponding size.

Although frames suitable for mounting theater projection screens may be fabricated from any material of the required strength and rigidity, the following wood structural members are suggested:

For Screen Sizes from No. 8 to 11:
2 x 4 main members with 1 x 3 angle braces at the corners

For Screen Sizes from No. 12 to 19:
2 x 6 main members with 2 x 3 corner braces

For Screen Sizes from No. 20 to 30:
2 x 6 main members with 2 x 3 corner braces and two 2 x 4 vertical center braces spaced approximately 12 feet apart with the addition of a 2 x 6 approximately 12 feet long, reinforcing the spliced main members at top and bottom.

Table of Frame Sizes

For Screen Size No.	Minimum Inside Dimensions of Frame				Over-All Screen Size Width		Height		For Screen Size No.	Minimum Inside Dimensions of Frame				Over-All Screen Size Width		Height	
	Ft	In.		Ft	In.	Ft	In.	Ft	In.		Ft	In.		Ft	In.	Ft	In.
8	8	7	×	6	7	8		× 6		20	20	10	×	15	10	20	× 15
9	9	7	×	7	4	9		× 6	9	21	21	10	×	16	7	21	× 15	9
10	10	7	×	8	1	10		× 7	6	22	23	1	×	17	7	22	× 16	6
11	11	7	×	8	10	11		× 8	3	23	24	1	×	18	4	23	× 17	3
12	12	7	×	9	7	12		× 9		24	25	1	×	19	1	24	× 18	
13	13	7	×	10	4	13		× 9	9	25	26	1	×	19	10	25	× 18	9
14	14	7	×	11	1	14		× 10	6	26	27	1	×	20	7	26	× 19	6
15	15	7	×	11	10	15		× 11	3	27	28	1	×	21	4	27	× 20	3
16	16	10	×	12	10	16		× 12		28	29	1	×	22	1	28	× 21	
17	17	10	×	13	7	17		× 12	9	29	30	1	×	22	10	29	× 21	9
18	18	10	×	14	4	18		× 13	6	30	31	1	×	23	7	30	× 22	6
19	19	10	×	15	1	19		× 14	3									

New G. E. Lamp Catalog

Incandescent lamps for motion picture projection and exciter lamps for sound-on-film reproduction are listed, illustrated and described in detail in General Electric Co.'s new photographic lamp catalog, just released. Copies can be obtained through local sales districts of G. E.'s Lamp Division, or by writing to Nela Park, Cleveland, Ohio.

Projection lamps listed range from 1500 watts down to 30 watts and deliver light intensities ranging from 42,500 lumens down to as little as 810 lumens. The company's 1,000-2,100 watt 35-mm projection incandescents are not shown in this catalog, but in a companion publication, Bulletin LD 19. One page of the catalog is devoted to exciter lamps; the user, however, is also referred therein to G. E. Bulletin LD 19 for more specific information on exciter lamps.

World Standards for Movies

One set of standards for motion picture equipment and practices throughout the world is the ultimate object that a meeting scheduled at Columbia University, New York, June 9-10th, by the International Organization for Standardization, is intended to promote. The American Standards Association was the host. Twenty-three leading nations, including the Soviet Union, Britain, France, Italy, Czechoslovakia, Netherlands, Switzerland and Belgium had been invited to attend; and ten to fifteen additional nations sent observers.

F. T. Bowditch of National Carbon, vice president of the SMPTE, presided at the world gathering. Chairman of the American delegation was D. R. White of du Pont. Other American delegates included: Joseph E. Aiken, Navy; Paul Arnold, Ansco; Herbert Barnett, General Precision; F. E. Carlson and E. K. Carver, Eastman Kodak; Raymond Davis, Bureau of Standards; Lt. Col. Alphons Dillinger, Army; G. L. Dimmick, RCA; J. K. Hilliard, Altec Lansing; H. J. Hood and D. E. Hyndman, Eastman Kodak; W. F. Kelley, Motion Picture Research Council; Henry Kogel, SMPTE; Dr. W. W. Lozier, National Carbon; J. A. Maurer, J. A. Maurer, Inc.; Boyce Nemec, SMPTE; M. G. Townsley, Bell & Howell; and J. G. Scott, Du Art Film Labs.

Eastman Shifts Personnel

Shifts in personnel announced this Spring by Eastman Kodak Company begin with changes in the identity of company president and chairman of the board, and continue through promotions and advancements of department heads.

Thomas J. Hargrave, president since 1941, becomes chairman, succeeding Perley S. Wilcox, now retiring, who has held that post since 1945. New president is Arthur K. Chapman, general manager since 1943 and vice president since 1941. Donald McMaster, vice president and assistant general manager since 1946 becomes general manager and vice president. Neil S. Kocher, who has been with Eastman for 30 years, is promoted to manage film manufacturing; and Dr. Louis K. Eilers, a veteran of 18 years with the organization, is named assistant manager of film manufacturing. Charles D. Snead is promoted to be manager of the cellulose products sales division.

DeVry Tops Record

All past company records for production of 35-mm and 16-mm projection equipment have now been exceeded at DeVry Corp., President William C. DeVry has made known. Moreover, DeVry expects still further increase in the company's output in the immediate future. Sales of 16-mm projectors to industry, educational institutions and government, and increased export of 35-mm mechanisms, account for the record demand.

IN THE
SPOTLIGHT

FELLOWSHIPS in the John Hay Whitney Foundation are now open to members of labor unions. An item in a recent issue of the AF of L *News-reporter*, Washington, D. C., stated that the Foundation has invited applications from members of labor unions who wish to "pursue leadership training in the field of labor." For further particulars the Foundation may be addressed at 30 Rockefeller Plaza, New York 20, N. Y.

• In appreciation of their untiring efforts on behalf of their fellow members, Fred Thome and Anthony Dente, business representative and first vice-president, respectively, of Local 650, Westchester County, N. Y., were recently awarded gold life membership cards and placques.

Fred Thome has been a member of the IA since October 1920 when he joined Local 453 (Willimantic, Conn.), later becoming affiliated with Westchester County Local 366. In March 1927, when Local 650 was chartered, he was elected its first financial-secretary and served in that capacity until January 1949, when he assumed the office of business representative, which he is currently holding. Thome has held office in Local 650 for 25 consecutive years and is highly regarded by the membership.

Anthony Dente became affiliated with Local 366 in 1925 and he, too, joined Local 650 when it received its charter back in March 1927. Dente has played a prominent role in Local 650 affairs and is popular with his fellow workers. In addition to holding the office of first vice-president, he is a member of the wage and organizing committee.

The presentations were made by Albert Storch, third vice-president of the Local.

• A highlight of the May meeting of the 25-30 Club was the presentation to Harry Mackler, former president, of a gold life membership card in appreciation of the many fine services he rendered the Club during his tenure of office. The presentation was made by Morris J. Rotker, also a former president of the Club.

Mackler is one of the old-line members of New York Local 306 and in past years served the Local in several official capacities—as president and as business representative—in addition to serving on various committees.

• Michael J. Mungovan, business representative of Local 25, Rochester, N. Y. for many years, was commended at the recent Silver Jubilee Convention of the New York Union Label and Trades Department, AF of L, for his 50-year record of outstanding service to organized labor. A standing round of applause greeted Mungovan when he was introduced at the Convention banquet.

• The death of F. P. (Reel) McCoy, 45, secretary of Local 444, New Kensington and Tarentum, Penna., shocked his many friends in the Alliance. He had been under medical observation for the past few months and hopes were held out for complete recovery from his ailment. McCoy was secretary of the Tri-State Association, and of the New Kensington Theatrical Mutual Ass'n.

He is survived by his wife and four children.

• The Massachusetts Federation of Labor will hold its 66th annual convention at the Statler Hotel, Boston, August 11-15.

• Marvin Bazin, 33, member of Philadelphia Local 307, was recently re-elected to the State (Penna.) Legislature by a majority vote of 14 to 1. Bazin, a Navy veteran of World War II and a graduate accountant, is employed as projectionist at the City Line Center Theatre in Philadelphia. He entered the political field in

Marvin Bazin

1950 and if his recent victory is any indication of his popularity with the voters in his district, Marvin Bazin is on the road to carve a fine political future for himself.

• A large trailer-truck crashed into the car of Albert Diodati, member of Pittsburgh Local 171, several weeks ago while he was driving home from work at the Twin Hi-Way Drive-In Theatre. Although his car was completely wrecked, Diodati escaped any injuries and outside of a pretty bad shakeup he is none the worse for his mishap.

• With a sale of 45,900 copies since it came off the press in July 1951, the "Brief History of the American Labor Movement" is considered among the top best sellers at the office of the superintendent of documents in Washington, D. C. This illustrated history was published by the Department of Labor's Bu-

OFFICIALS OF WESTCHESTER CO. (N. Y.) LOCAL 650 AWARDED HONORS

Fred Thome (left), business representative, and Anthony Dente (center), first vice-president, were awarded gold life membership cards and placques in recognition of services rendered Local 650 during the past 25 years. Albert Storch (right), third vice-president of the Local, is shown presenting the placques to Thome and Dente.

reau of Labor Statistics, has 66 pages and is available at 25 cents a copy from the Supt. of Documents, U. S. Government Printing Office, Washington, D. C. Ask for BLS Bulletin No. 1000.

• A heart attack proved fatal to Russel O'Toole, 45, member of Local 148, Indianapolis, Ind. O'Toole was a district maintenance man for RCA and was stricken while working in a theatre. He was a member of the SMPTE, Tripton Lodge No. 33, F. & A.M., the Eagles, and the Fraternal Order of Police.

• A testimonial dinner in honor of John N. Spearing, business representative of Local 511, Jacksonville, Fla., also marked the Local's 35th anniversary. The double celebration was held last month at the Roosevelt Hotel in Jacksonville, and was attended by top IA officials and many industry leaders. IA President Walsh presented Spearing with a gold life membership card in the Local.

Spearing has been a member of Local 511 since 1915, and has held the office of business representative for the past 25 years. He is also an IA representative, having received the appointment back in 1930 from former IA President Canavan.

• It is surprising but true, nevertheless, the number of people who are still unfamiliar with the social security benefits. From time to time we receive letters from readers asking us to clarify certain aspects of this law, and we believe that the following points, which appeared in *Nation's Business*, for October, 1951, will answer many of their questions:

1. It's not automatic. You've got to apply for it.
2. If you wait too long, you may lose money. Monthly payments are retroactive for six months from filing; death benefits are lost altogether unless applied for within two years of death. *Tell your family this.*
3. You, or your family, may have to prove right to benefits. Keep file of birth, marriage, death records, *etc.*, where the family can reach it.
4. You can collect your old-age benefits only if you make less than $50 a month—$600 a year—in covered employment. Most employment is now covered.
5. Unless you own your home *outright*, have other income (rents, royalties, dividends, insurance, *etc.*), you may find it impossible to retire on your social security.
6. The new social security law has increased benefits an average of 77½ per cent; makes retirement worth more than $20,000 *tax-free* (equal to at least $24,000 of taxed income); makes widow's and children's benefits worth $41,000, or more, *tax-free*.
7. New law currently reduces credits needed for benefits. A man of 65 with six quarters of covered employment after 1950 is fully insured. This means many old folks will collect up to $20,000 in benefits by paying $81 in tax.
8. New law gives automatic coverage for armed service during World War II. Anyone who served 18 months (unless dishonorably discharged) is fully insured until at least 1954.
9. Anyone more than 75 may make as much money as he can, even in covered employment, and still collect his social security *tax-free*.
10. The social security people recommend that you check up on your wage credits every year or so, make sure your employer is depositing the tax to your number. Send your account number, name, address, date of birth on a penny post card to the social security administration offices in your city.
11. Visit your local social security office to learn about your benefits.

JOHN SPEARING HONORED AT PARTY GIVEN BY LOCAL 511, JACKSONVILLE, FLA.

Among the guests of honor at the recent double celebration of the Jacksonville Local were, left to right: IA Pres. Walsh; L. W. Griswold, master of ceremonies; General Sec.-Treas. Wm. P. Raoul, and Spearing.

• Eddie Miller, business representative of Houston Local 279, was appointed to the House Committee of Variety Club Tent No. 34, of Houston, Texas.

• We are sorry to learn that Charles Croft, member of Indianapolis Local 194, is ailing at St. Elizabeth Hospital in Lafayette, Ind. He has our very best wishes for a speedy recovery.

• The officials of Local 482, Champaign-Urbana, Ill., successfully concluded negotiations with the management of the Family Drive-In Theatre and union projectionists are back at work there. The Local's contract with the theatre expired in the summer of 1951 and negotiations for its renewal ended when the Local officials refused to cut the manpower. The drive-in was picketed for the balance of the 1951 season, and at the beginning of the 1952 season the theatre management voluntarily offered to renew its contract on the same basis as the previous one, an offer which was accepted by the Union. Today all theatres and drive-ins in both Champaign and Urbana employ Local 482 men.

• A fatal heart attack ended the career last month of John O. Jones, 46, president and charter member of Local 730, Barstow, Calif. Jones also held membership in Local 720, Las Vegas, Nev., and was a delegate to the recent conference of Calif. District Council No. 2.

BOSTON LOCAL 182 EXHIBIT AT RECENT UNION-INDUSTRIES SHOW

Equipment items shown here are such old projectors as a Powers #5; Optigraph 1899; Edison Projecting Kinetscope 1897, and an Elge Arc Burner, 1903. Modern equipment included a Simplex XL; Strong Trouper Spotlight, and a 16-mm Ampro projector.

LETTERS TO THE EDITOR

To the Editor of IP:

I would like to add a hearty hear-hear to your "Monthly Chat" column for May. However, I would like also to add a word of gentle criticism concerning the apparent laxity with which some projectionists approach their work.

Twice in the last three weeks I have attended the two local theaters here in Bethesda and in *each* case at a dramatic point in the story the arcs extinguished. In one case sound ran for about sixty seconds before the projectionist became aware there was no picture on the screen. In the other he shut down and started up again.

When I lived in New York the same thing frequently occurred at the neighborhood houses. As long as some projectionists fail to take their work seriously I feel the public will tend to shy away from *paying for* poorly presented shows when they can get them on television for nothing. (The double meaning is intended!)

How about an article in the *International Projectionist* on the Alert Projectionist?

JOHN H. BATTISON
Bethesda, Md.

Ed note: Readers of IP do not need such an article—proof being that they pay to buy this magazine—while those projectionists who might benefit by the exhortation are just the ones that do not read IP and wouldn't see it. But are you sure the *projectionists* were at fault in the cases you mention? Did you go up to check on the conditions under which they had to work? We have in such instances and more than once found some poor projectionist struggling manfully and hopelessly with antiquated worn out junk of equipment that management refused to spend a penny on either to replace or repair.

We also have wondered why a projectionist took so long to find out his screen had gone blank, and found on visiting him that he was trying to do a two-man job all by himself and could not watch his screen at that particular time because then he was busy rewinding. For the careless projectionist we offer no excuse. We can do nothing about him because we can't reach him. He would neither buy nor read IP.

To the Editor of IP:

Your article "Better Film Care Improves Entertainment" (IP, *April 1952*) was very good, and helpful to the projectionist, but all damage to film is not done by faulty machines in the projection room. Careless methods in the inspection rooms of the exchanges are responsible for much of it. Very often the film is not examined at all. Indeed, one company just seals the reels with labels reading: "Checked but not examined."* Checked! Do they mean they made sure there was a film in the can and not a pair of old shoes?

Why don't the exchanges hire enough help to examine the film properly, and why are the examiners not taught to make lasting splices? Your magazine has repeatedly discussed hairline patches, and proved that they do not hold, yet the exchanges continue to use them.** Why do the exchanges use methods that are obsolete, and why do they not cooperate to save their own film?

RKO has placed stickers on their films which read: "Caution: This is a *new print*. Please be sure that projection machine is in good working order so as not to damage film." This label* in itself is liable to do damage by causing sprocket holes to break, and by making that piece of film stiff and brittle. I have received *old* film bearing the caution described above, and have found it in such bad condition that I could not use the print, and had to return it to RKO for a better one. Ironic, isn't it? Warner Brothers have

(*Continued on page 32*)

Red Cross OK's New Method of Artificial Respiration

A new "back-pressure arm-lift" method of artificial respiration has been approved by the American National Red Cross to replace the Schafer prone-pressure technique that has been taught to Americans for more than a generation. Research teams proved that an artificial respiration method suggested years ago by Col. Holger Neilsen of Denmark, with certain adaptations was twice as effective as the Schafer technique in moving air into and out of the lungs.

Here's how the back-pressure arm-lift method is applied:

The victim is placed on his stomach with arms folded under his head and his cheek resting on the crossed arms. The operator, kneeling at the patient's head, places his hands on the victim's back so that the thumbs touch each other and the heels of the hands are below a line running between the arm pits.

Keeping his elbows straight, the operator rocks slowly forward until his arms are approximately vertical; then he moves backward, slowly sliding his hands to the patient's arms just above the elbows. The operator continues to rock backward, raising the arms of the subject until resistance and tension are felt at the victim's shoulders. He then drops the arms and repeats the cycle 12 times a minute.

The new method helps to force air into the lungs as well as to expel it, where prone-pressure forces air out and relies solely on the elastic recoil of the chest and internal organs to pull fresh air into the lungs.

It is important to continue working on the subject for many hours, if necessary. Persons have been revived by this method as long as 10 hours after their natural breathing stopped. That's why you rest on one knee—after half an hour or so you can shift to the other knee, and keep on working. Even though the unconscious man starts to breathe, the pressure should be kept up for some time, or respiration may fail again.

In the new method of artificial respiration the first step is to lean forward from a kneeling position to apply pressure on the victim's back.

Then the rescuer rocks back, sliding his hands to the patient's arms. The elbows then are raised, pulling air into the victim's lungs.

16-mm

A NEW DEPARTMENT OF IP STARTING THIS MONTH, AND WHICH WILL APPEAR EVERY MONTH HEREAFTER

New Opportunities in 16-mm Projection

Explosive expansion of narrow-gauge activity provides increasing fields of employment for the skilled professional projectionist in television studios and at non-theatrical showings, as well as enhanced possibilities of personal business ventures on his own account.

FOUR factors have united to prod the progress of 16-mm sound projection into what is rapidly becoming an enormous industry in its own right, and one that is opening to skilled projectionists opportunities for employment or personal venture which have at present no visible horizon. It is in a way fascinating that a method and equipment for projection specifically invented and developed for amateur use has so drastically increased the demand for competent professionals. Of the four factors contributing to this result, two have been of slow growth and recent culmination, the third of rapid growth and the fourth explosively sudden.

Growth Factors

One factor of slow growth has been the technical improvement of equipment and procedures to the point where a development intended originally for amateurs now yields both picture and sound of professional quality. It is true that the best 16-mm to date is still not equal to the quality of the best 35-mm; but a great many theater presentations offered to paying audiences today are by no means equal to the best available 16-mm. This improvement in narrow-gauge pictorial and tonal values has not been at all sudden but gradual and very solidly based. Important progress in it has been made since the end of World War II.

A second factor, also of slow growth, has been the steady and relentless pressure of price inflation which naturally stimulated interest in any process that could produce reasonably comparable results at lower cost.

Of more rapid growth, still growing, and promising to expand prodigiously, is the use of 16-mm in television studios. Films are indispensable to TV. Both 35-mm and 16-mm equipment and prints are in use and operated by professional projectionists (an employment opportunity that may in the not distant future almost rival the theater itself). The present trend is strongly in favor of 16-mm for telecasting, as against 35-mm. Narrow-gauge costs less and its somewhat inferior quality as compared with the best 35-mm is unimportant because the quality bottleneck is not in the film or its equipment, but in TV. The pictorial TV bottleneck is the narrowness of the assigned frequency band, which cannot do justice even to relatively poor 16-mm, and the sound bottleneck is the tinny little loudspeaker used in most home sets.

Finally, and of very recent development, is the sudden and extensive addition of magnetic soundtracks to narrow-gauge film. These enormously increase the usefulness and therefore the popularity of 16-mm, because they make possible addition, erasure, or substitution of sound at will, anywhere, to any extent and as often as desired. Sales managers, convention managers, educators and others are naturally far more inclined to make use of film when the sound track is under their individual control, to be molded, modified and manipulated by each individual as he personally chooses.

Members of Local 110, Chicago, earned more than $50,000 in wages during 1951 operating 16-mm equipment at conventions, sales meetings and the like. The total wages earned by all members of all Locals throughout the U. S. and Canada has not been tabulated but must be substantial. And this was largely before magnetic sound had been added to increase the usefulness and popularity of 16-mm.

Removal by the government, this spring, of the ban on building more television broadcasting stations is expected throughout the TV industry to result in early launching of hundreds if not thousands of telecasting studios in every part of the U. S.—and it is quite safe to affirm that every one of them will use 16-mm projectors and need competent operating personnel from early morning to late at night.

Projectionists Profit

Personal ventures by projectionists in the field of 16-mm are nothing new. Ever since such equipment became available, back in the 1920's, theater projectionists have owned it, and rented it (and their own services as operators) for commercial showings. The current surge of interest in 16-mm expands the opportunities for such activity.

The skill and competence of the professional projectionist can be devoted to repairing and servicing 16-mm apparatus owned by others but only in the case of some products. Very recent inquiry among manufacturers reveals that some

Ampro Corp.'s latest magneto-optical 16-mm sound projector, with projector proper, speaker, and remotely located recording control set up for operation—recording microphone not shown.

will sell repair parts and furnish service information to projectionists wishing to engage in these efforts, but others will not cooperate in servicing by anyone except one of their established dealers. Still a third group of manufacturers state that they would sell replacement parts to persons other than their dealers at list price while the dealers are granted dealer discounts. Thus servicing and repair work in the 16-mm field offers projectionists only a limited opportunity.

Narrow-Gauge Details

The middle 1920's saw the birth and slowly increasing use of 16-mm. Essential to the entire project was the idea of "safety" film. An obvious proposal at the time was to standardize the new narrow-gauge reels at 17½-mm, exactly one-half the theater width. Alexander F. Victor, founder of Victor Animatograph Corporation, one of the principal manufacturers in the field, states that 16-mm was chosen instead of 17½-mm in order to discourage "a black market in which unscrupulous persons might split regular thirty-five millimeter (nitrate) film" and offer it as safe for home use by amateurs! "It was decided that the new film should be made 16 millimeters in width, which was a millimeter and a half less than a split thirty-five, and with film channels made to a 16 millimeter dimension, it would prevent the use of split theater film."

One current model projector is pictured herewith. Others will be presented in early future issues. Most of them use an intermittent movement of the claw type, in which a two-prong or three-prong claw takes the place of the intermittant sprocket; and is actuated, not by a Geneva cross, but by a pair of cams or some similar arrangement. In general, where two cams are used, one moves the claw toward the film and back and the other (when the claw is engaged in the sprocket holes) moves it downward and thus effects pull-down. Sixteen-mm sound film is perforated along one edge only, to leave room for the soundtrack along the other edge.

Most 16-mm units are designed from the start with the understanding that they may be operated by very unskilled persons and are equipped with corresponding devices for protection of both equipment and print. In some, the motor stops when a splice breaks or the film moves laterally away from its proper path. In others, special mechanical provisions assure that the sprocket and claw teeth will not damage the film even though it runs over them. Many makers provide permanent threading guides, in some cases in the form of a diagram of the film path affixed within the operating side door; in others a raised line or weal on the main-frame casting traces the actual path and shows the recommended loop size.

Many but not all 16-mm equipments are built to be portable and hence supplied with cables and plug-and-jack connectors; and also tilting devices.

Magnetic Sound

Except for such entirely minor details there is nothing at all about standard 16-mm sound equipment to give any experienced projectionist trouble in operation or more than merely nominal difficulty in maintenance. Just as in encountering any new item of 35-mm equipment for the first time even the most experienced projectionist needs to look it over to check the details of its arrangements, so in encountering any 16-mm model for the first time a check-up of its individual features is in order. However, except for the claw-movement intermittent, nothing very unfamiliar is likely to be encountered in any current commercial model.

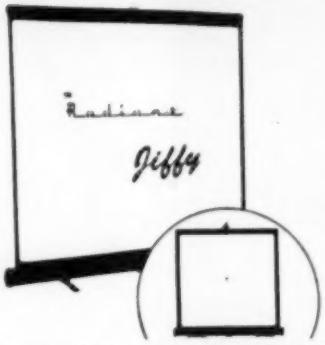
The magnetic sound feature, however, is comparatively new, and has as yet had no counterpart in wide-gauge theater practice.

The magnetic soundtrack consists of extremely fine particles of magnetizable iron oxide embedded in a suitable binder. The projector will mount recording and playback heads (likely to be one and the same) plus an erase head. The erase head is an electromagnet actuated by an alternating frequency above the audible range, commonly taken from the superaudible frequency used to light the exciter lamp. This frequency is generated by a vacuum tube oscillator. As the film passes over the erase head its hf ac completely demagnetizes the track, removing any previous record. The track then proceeds over the record-playback head—another electromagnet. If this carries an amplified microphone current a new track will be recorded. In playback, the record-playback head is not supplied with current but instead produces sound current in response to the magnetization of the moving track. Provisions are often incorporated to assure that an established track will not be destroyed accidentally by leaving the erase head active during playback. These provisions make playback either electrically or mechanically impossible as long as the erase head is operative.

By deliberate and intentional use of the erase head a whole track or any selected portion of it can be cleared of previous sound and re-recorded with any message or music desired.

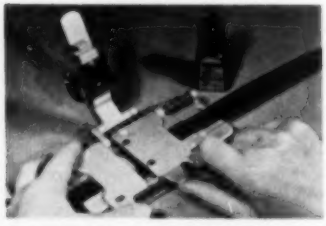
Magnetic erase, recording and playback details differ in the products of different makers, but the principles are always the same and present no basic problem to any projectionist.

RADIANT'S NEW 16-MM SCREEN



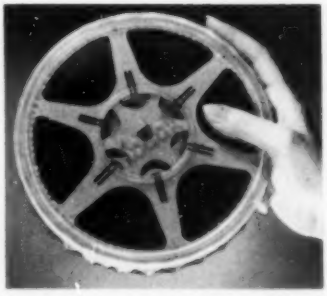
New portable 16-mm screen which rolls up like window shade when not in use and is guaranteed by its maker to remain permanently white.

SPLICER FOR 16-MM PRINTS



Described as featherweight, simple, compact, efficient, this German-made Siemens 16-mm splicer is built with self-sharpening knife edges and a scraper made of specially developed synthetic material. It has been placed on the American market by Ercona Camera Corporation. A companion piece, an all-aluminum 16-mm editing board by the same manufacturer, is available with it.

16-mm PLASTIC REEL CAN



Eastman Kodak Co. announces this new 16-mm polystyrene plastic film reel can, so completely transparent that the contents are visible at all times and titles written or printed on the contained reel can be read at a glance. The amount of film actually in the can (and approximate running time) can readily be estimated without opening it. It is adapted to 400-foot reels.

Optical-Magnetic 16-mm Sound Projector‡

By G. A. del VALLE and F. L. PUTZRATH*

Heretofore, the task of recording sound on 16-mm film has been a job for the engineer and the most aggressive amateur. With the advent of successful striping of 16-mm film with magnetic coating, synchronized sound with picture is now a reality for a greater number of people. The instrument described herein has been designed to record, reproduce and erase magnetic soundtrack.

EVER since iron oxide coated tapes became an accepted medium for sound recording, the possibility of applying the same material to 16-mm motion picture work has been very evident. Work in our laboratories at Camden for developing and designing equipment to handle this film has been going on for several years.

The projector that we are about to describe is basically an RCA 400 Senior projector (Fig. 1) which has been modified to accept the component parts required for recording and reproducing magnetic sound track without altering, in any way, the characteristic simplicity of its threading.

This projector performs four functions: (1) It reproduces photographic sound track; (2) it erases and records magnetic sound track; (3) it reproduces magnetic sound track; (4) it can be used as a public address system. Any one of these four functions can be chosen by simply turning two knobs, one (Fig. 2) to select the amplifier operation desired, and one (Fig. 1) to select the type of sound track to be played. Recording level is checked by a glow-lamp indicator which is located on the upper portion of the amplifier panel.

For recording and reproducing magnetic track, a very small record-play combination head has been mounted inside of the sound drum. The erase head has been mounted just ahead of the upper sprocket, Fig. 1. The location of the record-play head inside the sound drum offers several advantages over any other location. The constancy of film motion is optimum at this point and the distance from sound to picture can be maintained exactly the same as that standardized for photographic and proposed for magnetic tracks.

In order to obtain maximum tracking of the head against the film, it was found necessary to provide four distinct adjustments for the record play head: azimuth, lateral, pressure and bearing adjustments.

The erase head has also been mounted on a hinged arm but for a different purpose. Perhaps one of the weaknesses of magnetically recorded sound is the possibility of unintentional erasure of the recorded signal. In the RCA 400, rewinding of film is accomplished by merely threading the tail end of the film into the upper reel, tripping the rewind lever, and starting the projector. To render the projector as nearly foolproof as possible, interference was intentionally provided between the rewind lever and the erase head.

In other words, upon completion of a

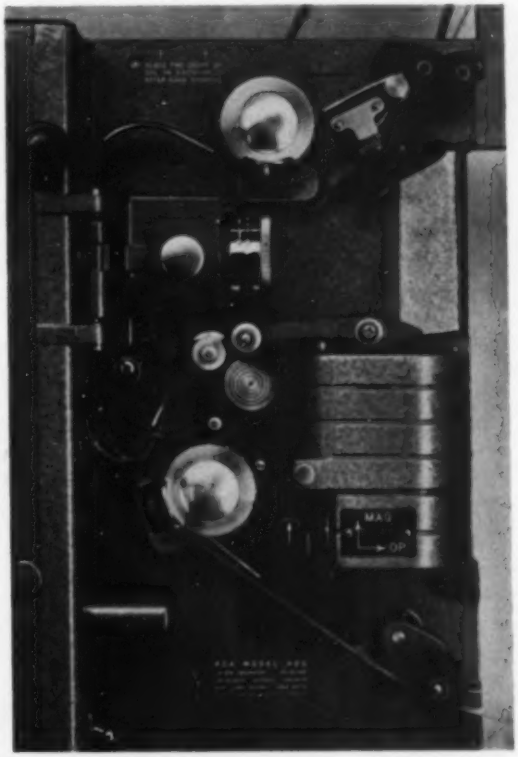
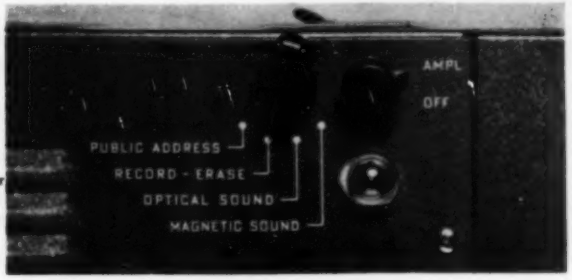


FIGURE 1. Operating side of the RCA-400 optical-magnetic projector showing film path, erase head, rewind lever and track control switch for selection of either magnetic or optical reproduction.



Four-position amplifier function selector switch; off-on switch and sound level indicator lamp just below off-on switch.

‡ J. Soc. Mot. Pict. & Tv Eng. for April, 1952.

* RCA Victor Division, Eng. Prod. Dept., Radio Corp. of America.

recording, the erase head must be moved out of the way to permit the rewinding of the film. This automatically removes the erase head from the film-threading path. One can erase only when the erase head is deliberately pushed down into position and the film threaded through it.

Besides this precaution, it is also necessary to turn the function-selector switch in the amplifier to the *Record-Erase* position and to insert a plug in the input jack. If any one of these last two operations is not performed, the erase head will not be energized. For efficient erasure of the recorded signal, it is also essential that good physical contact be maintained between the sound track and the magnetic gap. For this purpose, we have provided a small plastic shoe with very light pressure which holds the film directly against the magnetic gap of the erase head.

Two guide rollers have been provided ahead of the erase head. These rollers maintain the film at a constant angle as it enters the erase head independent of the reel diameter.

FIG. 3. Sound drum partially removed to show magnetic head assembly.

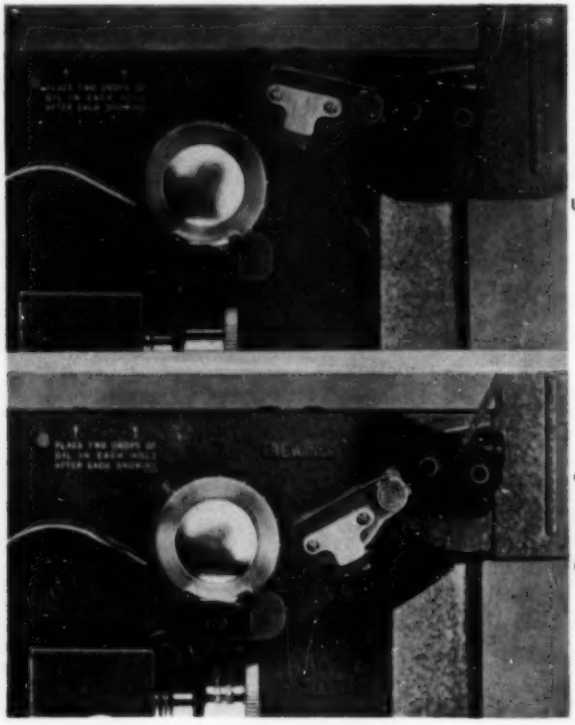


FIGURE 4. Erase head and rewind lever. Upper picture: rewind position with erase head physically shifted to make accidental erasure during rewinding impossible. Lower picture: erase head in operating position. Lubricating holes at upper left in each picture.

As mentioned before, the projector reproduces photographic track. This is accomplished by merely placing the selector switch (Fig. 1) in the *Optical Sound* position and the track selector on *Optical*. When the track-selector knob is moved to this position, a microswitch completes the circuit for the exciter lamp and at the same time the magnetic head is retracted to prevent it from making contact with the film. These two precautions not only make it mandatory to turn the track-selector knob to obtain exciter-lamp excitation, but also make it impossible to scratch the track as it passes over the magnetic head when reproducing photographic sound.

The Amplifier

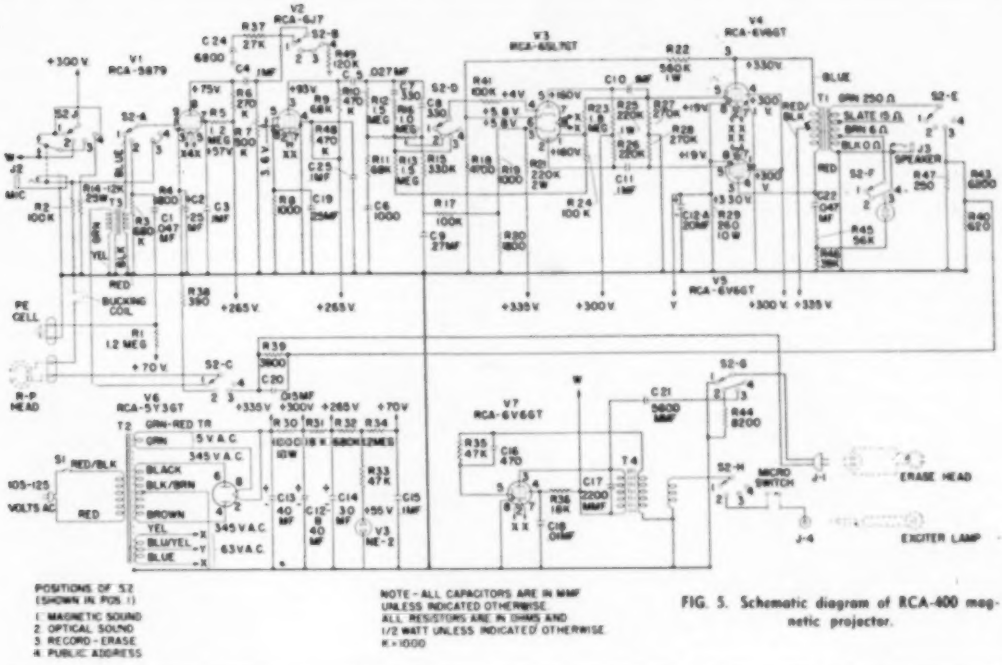
The amplifier described in this article is somewhat similar to the one used in the 16-mm Senior RCA 400 Projector. The new amplifier model (Fig. 5) meets all the performance requirements of the standard projector and, in addition, has all the facilities necessary for the recording, reproducing and erasing of sound on the magnetic-coated film. The modification of the amplifier has been accomplished mainly in two steps:

(1) The gain of the amplifier proper has been increased by substituting a pentode for the former triode voltage amplifier, resulting in the following tube complement: 1—5879 voltage amplifier; 1—6J7 voltage amplifier; 1—6SL7GT voltage amplifier, phase inverter; 3—6V6GT push-pull output stage, rf oscillator; 1—5Y3GT rectifier, and 2—NE-2 voltage regulator, recording level indicator.

(2) A 9-pole, 4-position switch has been used to permit the selection of any one of the previously mentioned projector functions.

For the reproduction of magnetic sound (S2 in position 1) the record-play head is connected to the primary of the input transformer, the secondary winding of which is connected to the grid of the first voltage amplifier. A special load is connected to the plate circuit of the first voltage amplifier giving the required low-frequency compensation. The signal then goes through the regular amplifier path, including the pentode and triode amplifiers with their volume and tone controls, the phase inverter, and the push-pull output stage. The amplifier load is the speaker. To avoid possible erasure of the magnetic film no plate power is applied to the oscillator tube. However, a dummy load maintains a constant load on the power supply.

For the recording of sound on the magnetic film (S2 in position 3) the grid of the input is connected to the microphone. The signal follows the regular amplifier



POSITIONS OF S2 (SHOWN IN POS. 1)
1 MAGNETIC SOUND
2 OPTICAL SOUND
3 RECORD - ERASE
4 PUBLIC ADDRESS

NOTE - ALL CAPACITORS ARE IN MMF UNLESS INDICATED OTHERWISE. ALL RESISTORS ARE IN OHMS AND 1/2 WATT UNLESS INDICATED OTHERWISE K = 1000

FIG. 5. Schematic diagram of RCA-400 magnetic projector.

path except that the tone control circuit is disconnected, insuring a "flat" recording characteristic. The speaker load is disconnected to avoid accidental acoustic feedback. In its place, a dummy load is connected across a 250-ohm output winding. A suitable voltage divider across this load feeds the record-play head through the compensation network (R-39 and C-20).

In order to avoid accidental erasure the oscillator receives plate power only while a microphone plug is inserted. The oscillator load is connected from the primary side of the transformer and is formed by a series-parallel combination of the erase head, the record-play head, C-20, R-39 and R-40. Thus, the mixing of the audio and biasing currents for the record-play head occurs between the head and the compensating network. The switch section which was used to disconnect the speaker load now completes the circuit of the recording-level indicator, an NE-2 tube. The resistive network associated with this indicator is adjusted so that the indicator flashes at a signal level slightly below the overload point of the film.

Magnet Bias Control

In order to avoid distortion and high hiss-level, it is imperative that no residual magnetism be left in the record-play head. Thus, means must be provided to decrease the bias current in this head to a small value before it is entirely removed.

In this model a step-by-step bias attenuation is accomplished automatically when the amplifier is switched from the magnetic recording position. In particular, S2-J (being a shorting-type switch) temporarily parallels the oscillator tube and the dummy load that otherwise takes its place. Thus, a reduction in B-supply voltage is effected, decreasing the recording-head current. S2-G and S2-H (also of the shorting type) temporarily load the oscillator tank primary and recording windings with R-44 and the exciter lamp respectively also effecting a decrease in bias current.

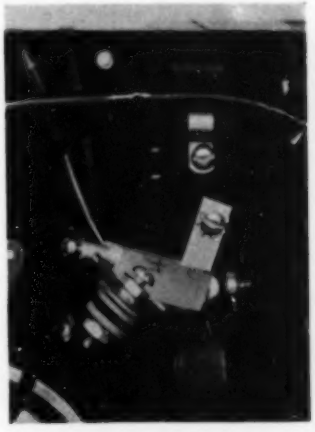


FIG. 6. Hum-canceling coil located on the main frame of the projector.

Similarly S2-C shunts the record-play head with R-38. Since these means of reducing the bias current in the record-play head will occur successively in some random sequence, the head will be left in an essentially de-magnetized state at the time when the biasing current is completely removed. If the microphone jack is removed while S2 is in the *Record-Erase* position, the capacities associated with the oscillator will permit exponential decay of the amplitude of oscillation.

Hum Elimination

Residual hum is eliminated by the use of a hum-bucking coil in series with the record-play head. It was not possible to obtain a single minimum hum-bucking coil adjustment for the two conditions of projection lamp "on" and "off." However, a compromise coil position was found which gives satisfactory overall performance.

The performance of the electrical system may be summarized as follows: Since the output stage of the amplifier remains essentially unchanged, the power output rating is identical to that of the

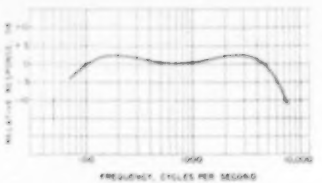


FIG. 7. Overall frequency response of the system for a signal recorded and played back.

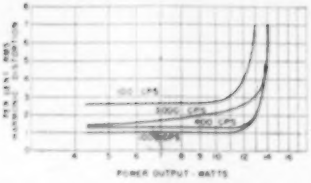


FIG. 8. Distortion curves of the amplifier at different frequencies.

original amplifier. Also, overall characteristics of the amplifier for optical playback and public address remain unchanged.

During magnetic recording, it is possible to have 35-db attenuation in the volume control before the input stage overloads. The amplifier output networks are adjusted so that the amplifier distortion will always be small compared to that of the recorded signal. Thus, optimum signal-to-noise ratio is obtained during recording.

With modulated film, the amplifier has approximately 15-db gain reserve during playback. Under these conditions, the signal-to-noise ratio is 50 db with the tone-control in the flat position. The overall frequency response of the system, for a signal recorded and played back on this projector, is flat within 5 db from 100 to 6000 cycles/sec.

General specifications of the RCA 400 are given in Figures 7 and 8; Figure 9 shows the complete unit.

One particular advantage of magnetic recording is that the sound track is independent of the film emulsion or developing processes. Sound can be added either before or after the film has been developed for picture, resulting in great flexibility of editing. Lip synchronization can be obtained in a few trials.

Besides the conventional method of recording sound on a standard 100-mil track, some variations have been tested which present decided advantages for certain applications. For example, half of the width of an optically recorded track can be coated with iron oxide material. Although the output of both tracks is cut by 50% and their signal-to-noise ratio decreased, great practical advantages can be realized. For instance, the tremendous wealth of knowledge that has been accumulated in this country in instructional 16-mm films can be released immediately to our friends overseas. They in turn can make their own translations and recordings at a very nominal cost per print. This is but one of the many possible applications of a 50/50 track.

The cost of producing sound on 16-mm film with this multi-use equipment has been estimated to be about one-third of the cost of achieving comparable results photographically. In addition, film waste due to recording errors is eliminated.

DISCUSSION

Loren L. Ryder: In the interest of standardization with respect to frequency characteristics, I wonder if you are in a position to make available the frequency characteristics of this recorder-reproducer at this time. It may be to the advantage of all if at an early date there is a semblance at least of standardization so that the product to be reproduced on your equipment or handled with other equipment might be interchangeable. Is that information available?

O. B. Gunby: Since the authors of this paper aren't here and detailed information on the frequency characteristic is not available at the present time, your question will have to be referred to them. However, I have a slide here that shows the frequency response used in making this demonstration film.

Lloyd Goldsmith: Speaking as chairman of the Sound Committee for the Society I'd like to report that our Subcommittee on Magnetic Recording is attempting to stand-

(*Continued on page 29*)

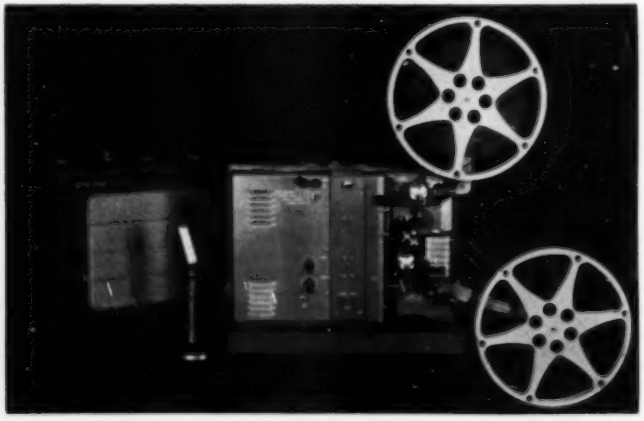
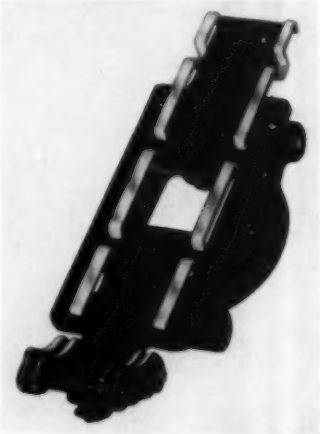


FIG. 9. The RCA 400 magnetic projector ready for operation.

LaVezzi Improves Film Trap



Steadier projection, less wear and fewer interruptions are advantages claimed for this new Simplex-type film trap, developed by La Vezzi Machine Works for Simplex and Super-Simplex type mechanisms. The pads (as in more modern projector models) have been extended to cover practically the whole length of the trap. Centrally located conical tension springs, also a feature of more modern mechanisms, have been provided to assure equalized and adjustable pad tension. The intermittent sprocket film guide at the lower end of the trap is similarly provided with a centralized conical tension spring adjustable by turning a knurled nut. Stop studs control the spacing between closed trap and the film guide tracks.

Projection is steadier because the film is under tension throughout a greater portion of its length; wear on both intermittent sprocket and film is lessened because the tension, being adjustable, need never be excessive; and possibility of interruption is reduced because correct tension, equal along both edges, is less likely to tear patches. The trap part number is E-78-L for standard mechanisms and E-78-LS for Supers.

TECHNICOLOR

(*Continued from page 9*)

such becomes relatively more important among the factors that make up the complete attractiveness of the picture. Therefore scratches and flaws in the print, whether caused by dirt in the film path, misalignment, overworn parts, or faulty threading, are relatively more harmful than in black-and-white. Additionally, they impair a more valuable article since Technicolor prints, which must go through a more elaborate process of manufacture, necessarily cost more to replace when damaged than do black-and-whites.

Screen illumination level is also important; the density of Technicolor prints is so controlled as to produce the most satisfactory image when the light falling on the screen is approximately 12 to 14 footcandles, with normal carbon trim and shutter action, but no film threaded in. When such illumination falls on a clean, flat, white screen, the resultant brightness is satisfactory for best viewing of Technicolor prints.

Producers in Hollywood are aware as never before of the color ingredient in the success-formula. On this point there can hardly be a better yardstick than the activity of the Technicolor Motion Picture Corp. laboratories. Dr. Herbert T. Kalmus, president and general manager, in his message to stockholders accompanying the annual financial report for 1951, disclosed that 76 feature pictures were produced in that year in Technicolor as against 70 in 1950, and 45 in 1949, and exactly 2 in 1932. Hollywood's conviction that Technicolor spells good box-office is sufficiently evidenced by these figures.

By applying his skill and knowledge to secure the aforementioned conditions during every reel of every Technicolor showing the projectionist will be doing his part in the overall cooperative effort necessary to create that pleased and satisfied patronage whose willingness to return is all-important to the theatre's prosperity and even to its survival.

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INSPECTION, SPLICING AND CARE OF FILM

(*Continued from page 14*)

lowed. It is important to use fresh cement. Bench bottles should be cleaned out regularly and filled with new cement.

Poor splices attributed to the particular brand of cement being used, or the characteristics of the film, may in most cases be explained by lack of attention to details covered in the above paragraphs. Helpful hints on good splicing and splicing faults are given in Figures 13-23.

Film Deformation

Motion picture film is similar to other plastic materials in that it has certain physical limitations. Distortions can occur through improper storage, through faulty handling and under very severe projection conditions. The various types of distortion are commonly referred to by exchange inspectors and theater projectionists alike simply as "warping" or "buckling." It may happen that the exchange is at a loss to understand the problems encountered by the projectionist because the description of the condition of the film has been inadequate. Likewise, conditions correctly described would help the laboratory locate the source of the difficulty. A uniform terminology pertaining to different types of film deformation will be of great assistance in locating the causes of such deformation and in eliminating further trouble. Some of the most common forms of deformation are illustrated in Figures 24-27.

FIGURE 21
Tilted springs

FIGURE 22
Cement-etched scraping surface

FIGURE 23
Dull scraper

BUCKLE: This type of distortion may be either temporary or permanent. *Temporary buckle* results from loss of moisture from the edges of the film when rolls are stored under dry air conditions. *Permanent buckle* is caused by loss of solvent from the edges of the film when rolls are stored in moist air.

EDGEWAVE OR FLUTE: This type of deformation may also be either temporary or permanent. *Temporary edgewave or flute* may occur along both edges as a result of elongation of the edges relative to the center of the strip during early storage under moist conditions. *Permanent edgewave or flute* may occur along one edge if the roll is wound under high tension.

TWIST: This effect is produced in new prints by loose winding of the film emulsion side in, under dry air conditions. If the film is wound emulsion side out under the same conditions, the undulations do not alternate from one edge to the other as shown in Figure 26, but are directly opposite one another.

CURL: This type of deformation is caused by dimensional differences between the emulsion layer and the support. It results from changes in moisture content of the emulsion layer and support with variation in relative humidity.

SPOKING: This type of distortion is caused by loose winding of film which has a high degree of curl. *Permanent spoking* is seen as *twist* when the film is unwound. *Temporary spoking* disappears when the film is unwound.

EMBOSSING: This is a type of deformation which often occurs when prints are projected with high intensity lamps. The excessive heat causes actual expansion of the picture area, and the frame stands out in relief. This distortion has no detrimental effect on the screen image quality.

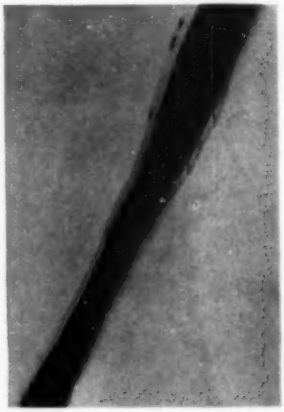

FIG. 26. *Film Twist.* An extreme flute or edgewave extending all the way to the center of the film. Waves thus alternate from edge to edge.

FIG. 24. *Film Buckle.* This is the condition that exists when the edges of the film are shorter than its center section. (Opposite of Fig. 25).

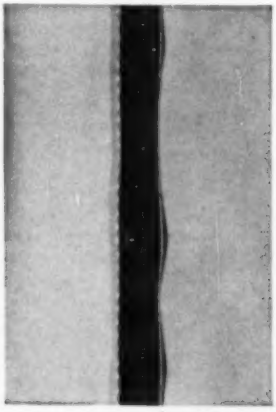

FIG. 25. *Film Flute.* Also called *Edgewave.* Condition that exists when edges are longer than film center section (Opposite of Fig. 24).

FIG. 27. *Film Curl.* When one surface is shorter than the other. With emulsion side concave the curl is positive; in reverse case, negative.

OPTICAL-MAGNETIC 16-MM SOUND PROJECTOR

(*Continued from page 26*)

ardize, or at least act as a clearing house for information on the frequency response and the pre- and postequalization in these magnetic recorder-reproducer projectors for the benefit of all. Accordingly, Glenn Dimmick has already circulated this information to the Subcommittee with respect to the RCA projector and I will be very glad to make it available to Mr. Ryder. Also, Ampro has indicated their division of pre- and post-equalization, and I'm sure that before very long there will be agreement on recording-reproducing characteristics to allow complete interchange of magnetic film made on this type of projector.

Mr. Ganby: The slide is now ready for presentation. You will notice that it gives only the overall frequency response. It probably doesn't completely answer Mr. Ryder's question, but the information referred to by Mr. Goldsmith, which can be obtained from the Subcommittee on Magnetic Recording, will likely provide the additional data requested.

16-mm Flourishes in Britain

Approximately 36 permanent theaters and 1,000 mobile units show an estimated 300 feature films over commercial 16-mm equipment in the United Kingdom each year, according to Nathan D. Golden, Director of the Motion Picture and Photographic Products Division of the U. S. Department of Commerce.

Golden, reporting from the U. S. Embassy in London, reveals that five main companies distribute American and British entertainment features in 16-mm versions; the principal company engaged in this activity being one owned by Britain's leading 35-mm tycoon, J. Arthur Rank. Additionally, film libraries rent out 16-mm versions of imported and domestic 35-mm features, Golden's report discloses.

The 36 permanent 16-mm theaters are in general located in rural areas remote from 35-mm enterprises. They are less stringently regulated than 35-mm theaters, particularly with reference to the welfare of juvenile patrons; but a bill pending in Parliament proposes to put 16-mm and 35-mm enterprises on equal footing.

New Radiant 16-mm Screen

A new portable, demountable, 16-mm matte surface screen is announced by Radiant Manufacturing Corp. It weighs 6 pounds, measures 3' x 3'; can be used on tables or desks by means of a collapsible supporting arm or suspended from a wall; and when not in use it rolls up like a window shade into its protective case. The manufacturer represents that the surface is washable, and will not peel, crack or rot. Permanent whiteness is guaranteed.

Victor Has New Model

Victor Animatograph announces a new model 16-mm sound projector suited to use with audiences up to several hundred in number. Projection lamp is 750 watts, sound output rated at 4 watts. Designated Model 60-4, this latest Victor is light in weight and includes the standard Victor features such as safety film trip, 180-degree swing-out lens mount and large drive sprocket, among others. Operating speed can be set at either 16 or 24 fps; price varies between $417 and $395 according to whether 12-inch or 9-inch speaker is preferred; provisions for plugging in microphone or record player are incorporated.

RCA Promotes Bradford

C. M. Odorizzi, operating vice president of RCA Victor Division, announces promotion of C. V. Bradford to be manager of the company's East Central Region with headquarters in Cleveland. Bradford is a veteran of 20 years service with the company, working in various sales positions and as an expediter in the Middle West, New England and New York. He is a native of New England, and was educated at Northeastern University in Springfield, Mass. The Region of which he is now manager comprises all of Ohio and substantial areas of Michigan, New York, Pennsylvania and West Virginia.

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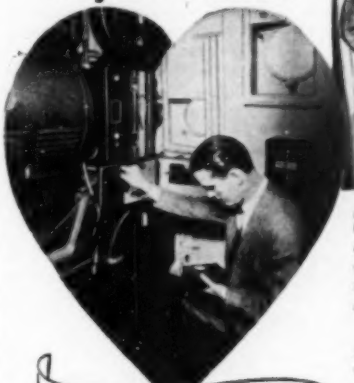

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CAMDEN, NEW JERSEY

New Splicer for Exchanges

Too expensive for the average theatre but claimed by its maker to be economically ideal for film exchanges, an automatic splicing machine known as Presto-Splicer joins nitrate or acetate film in butt-welds, without overlaps, and without need for skilled labor. Its maker is Prestoseal Manufacturing Corp.

Any exchange worker can produce perfect results with the Presto-Splicer, and the join thus made has approximately 90 percent the strength of the film itself, according to Prestoseal's Leonard Herzig. Since the joint is butt-weld (end to end) with zero overlap, chances of the splice catching or tearing in the projector are enormously reduced, Herzig explains, and the resultant saving in film damage, as well as the fact that completely unskilled labor can be used, abundantly repays a film exchange for the relatively high first cost of the device, he asserts. The theatre, which does not own the film, and which is staffed with projectionists, not film inspectors, is not similarly situated with reference to the cost of the Prestoseal Splicer; but where this is used by the exchange the theatre benefits indirectly in the fact that prints supplied come with stronger patches less likely to tear.

Produces End-to-End Weld

Action of the splicer is to produce a true weld, comparable in principle to a soldered butt-weld between two strips of metal. As the film is placed in the splicer and the appropriate lever lowered it is so cut that the two ends to be joined abut each other only a slight fraction of an inch apart. Operation of the film-cutting lever also applies a "flux"—a plasticizer—to the cut edges that are to be joined. A clamping lever is lowered to hold the film-ends rigidly in place and heat is automatically applied. After the specified number of seconds the film is released and the cut ends are found welded together; the splice is complete; the film ready for use.

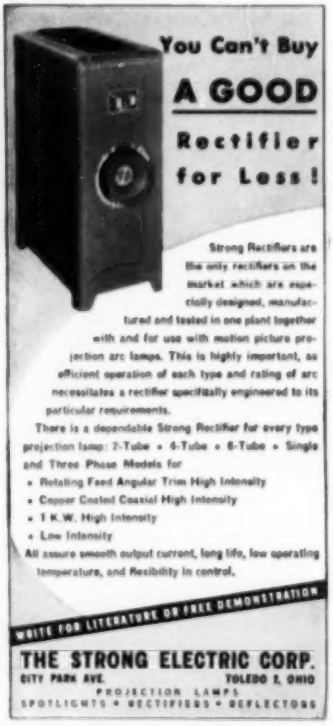
Scraping cannot be done poorly, because there is no scraping; too much or too little plasticizer cannot normally be applied because normally the correct amount is applied automatically. The splicer must be operated according to instructions for the type of film to be joined, but the instructions are such that the operator needs only attention and obedience to follow them, not skill.

The identical splicer can be used for both 35-mm and 16-mm prints by changing heads; an operation needing no tools and less than a minute of time.

Although novel to the motion picture field, Presto-Splicer is not new; it has been used for several years for splicing microfilm records.

IA-IP 'HAM' AWARD WINNER HARWOOD

John Harwood, W8VDP, Local 160, Cleveland, has been in show business since he was 10 years old and in radio since he was 14. When Harwood was 10 the projectionist at his father's theatre was Frank Masek, now a charter member of Local 160, a gold-card holder and a member of the staff of National Theatre Supply. Masek taught the 10-year-old Harwood to run the Powers projector while he, Masek, "wooed his wife-to-be out in the balcony, hi." In 1920 Harwood, then at the ripe age of 14, built crystal sets for himself and his friends. In 1928 he was operating projection rooms under jurisdiction of Local 160 both at the local theatre and at the local high school. During World War II he served with the Signal Corps.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George Eastman's First Camera

IN 1888 George Eastman invented a simple box-camera which he named the "Kodak." It was already loaded with enough "American film" for 100 exposures when you bought it for $25. Anybody could operate it. You simply pulled a string (to cock the shutter), pressed a button (to release it), and turned a key (to wind on fresh film). After 100 exposures had been taken, the entire camera was returned to the factory where the film was processed, and prints made from it. The Kodak system was a combination of a simplified camera, roll film, and processing service, and it was at once a great success.

Most of the steps leading up to the Kodak system are well known: Eastman's plate-coating machine, negative paper, stripping "American Film," and roll holder. But the camera which he first designed is something of a mystery. Intensive search has failed to turn up an example, yet before the Kodak camera was even announced, at least 40 "Detective Cameras" were sold.

Details of First Camera

Full details about this elusive camera may be read in the specifications for U. S. Patent No. 353,545, granted Nov. 30, 1886, to George Eastman and Franklin M. Cossitt. The accompanying drawing shows that the camera was outwardly the leather-covered box which had already become familiar to the American public.

Inwardly, it was fitted with a most unusual shutter. A hollow, truncated, triangular prism of sheet metal was pivoted inside the camera box. The open base faced the lens. During exposure, the apex of this funnel-like device traveled across the sensitive material: bit by bit the image of the lens was received by the plate or film. In a sense this was a focal plane shutter. For time exposures, the upper and lower parts of the prism—the jaws, Eastman called them—could be separated. The camera accepted either a roll holder, for enough negative paper for 48 4 x 5 negatives, or holders for glass plates.

First Shown in 1886

A search through George Eastman's correspondence reveals that a model of the Detective Camera was first exhibited at the St. Louis Photographic Convention in June, 1886. He ran into production difficulties almost from the start. "We have been the victims of annoying delays," he wrote on November 17. "We have been unable to get the special form of brass rod for the double holders which are to be used with the camera. We have about 75 cameras nearly done which are waiting for the holders. We do not want to send any out until we are sure that the holder can be put into each and every one without fitting."

A year later, in May: "The price of the Detective Camera is $45." By June the first 50 were completed to Eastman's satisfaction. In January of 1888—the year of the Kodak—Eastman offered W. H. Walmsey, a Philadelphia dealer in photographic goods, 40 of the cameras at $33.75 each for sale at $50. "We shall not make any more of them," he wrote, "owing to the expense, there being no probability of our being able to make anything on them in any quantity. We therefore want to get rid of these without distributing them all over the country. Can you not make a specialty of them?"

In September the new Kodak camera, of much simpler construction, was put upon the market. In its design, Eastman learned much from his experience with the ill-fated Detective Camera. In outward appearance it was the same. But instead of a removable roll holder for American Film, spools were built in. The clumsy internal shutter was replaced by one of an equally ingenious design:—the lens assembly was surrounded by a tube with two holes in it which revolved when the familiar button was pressed: as the holes passed across the lens, the exposure was made.

It is hard to believe that of the 40 cameras sold to Walmsey, not one now exists. The exhibition of photography at the George Eastman House, Rochester, cannot be considered complete until an example of this 1886 Detective Camera is found.

Fresno Theatres Install TV

Two Fresno, Calif., theaters have installed large-screen television—the Paramount, 2646 seats, and the Warner, 2169 seats. The latter is the sixth Warner theater in California to be fitted with large-screen TV; the others being in Hollywood, Huntington Park, Los Angeles, San Bernardino and Santa Barbara.

RKO Earns 334 Thousand

Consolidated net profit for one year of operation of RKO Pictures Corp. was $334,627, President Ned Depinet reveals. Spring, 1952, grosses have been larger than those of the same period for 1951, Depinet added, but have been less profitable.

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PROTECTING THE THEATRE—FIRST PLACE IN ENTERTAINMENT

LETTERS TO THE EDITOR

(Continued from page 20)

the honesty to tell you that they are not inspecting the film and RKO tells you they are sending you a new print—which isn't new.

The projectionist replaces worn parts of his machines to avoid breaks and damage to the films. Why do not the exchanges do their bit by replacing damaged reels and damaged cans to help save their own films? Four-reel cans are much too heavy to be handled properly by delivery men or the young help in the theaters. The result is that these cans are thrown off and on the trucks, become bent, and crush the films inside. Crushed reels of film cannot be extricated without the use of tools which cause further damage to the film.

Films are delivered to the projectionist with leaders in such bad condition that it is impossible to repair them. Why are these leaders not replaced by the exchanges? Very often films arrive without any leaders. Where do we get new leaders for these films or replacements for the torn ones? I take them from trailers or from prints which have extra long leaders or tails, and I do not hesitate to use the property of one exchange to mend the property of another. A little cooperation here would result in money saved for the exchanges.

Can't the officials of the IA or of the various locals take up this matter with the exchanges, and ask that the inspection of films be done properly, and that repairs be done by competent workers? It would do much to ease the life of the projectionist who is always blamed for every stoppage which occurs in a show. Very often the blame should be placed squarely on the exchanges.

M. H. WINTON
Kimball Theater
Yonkers, N. Y.

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* A sample of this label accompanied Mr Winton's letter.

** With his letter Mr. Winton sends some horrible examples of such patches.

To the Editor of IP:

Many previous writers have stressed the need for even rewinding onto exchange reels. If the film is not evenly wound the protruding edges become damaged when the reel is forced into a bent shipping tin. For some unknown reason exchanges still continue to use reels and tins years after they should have been in the scrap heap. With such reels it is practically impossible for the projectionist to do justice to the film that is in his care.

However, since we are forced to use these old reels, we have to make the best of it. A good job of rewinding can be done on these reels if we use an idler roller to guide the film as it goes onto the reel. The construction of such an idler roller is very simple and any projectionist handy with tools can make one for a few cents.

I have made such an idler. A wooden base block measuring 4½" long, 2" wide and 1½" high is permanently bolted to the rewind bench. At either end of this base block is a hole taking a ¼" bolt. By means of this bolt, a washer and a wingnut, an idler bracket can readily be fastened to either end of the base block. The bracket, which is steel, measures 3¾" high. It mounts a 3/16" stud ½" below the top. A flanged idler roller, which may be either hardwood or bakelite, rotates on this stud. My roller is 2" inside diameter with a ¼" flange.

When this home made assemblage is aligned and bolted down to the hand rewind base and the film threaded under the flanged idler roller on the way to the takeup reel, the tension of the film between the two reels will hold it in the idler roller groove and the idler roller will guide it onto the takeup reel evenly, with no edges sticking out to be damaged by insertion into a warped shipping can.

The roller bracket and roller are easily removed from the base block by taking off the wing nut. For rewinding 1,000 foot reels they should be mounted on that end of the base block that is nearest the takeup reel; for 2,000 foot reels at the opposite end of the base block. Before beginning to rewind, each takeup reel must be checked for wobble. If its edges rub against the film they should be bent outward so as to clear it all around, giving the film a free path. It will then wind up evenly under the guidance of the idler roller, and after rewinding is completed the reel edges can be bent back against the even roll of film.

J. G. JACKSON
Capitol Theater
Port Alberni, B. C. Can.

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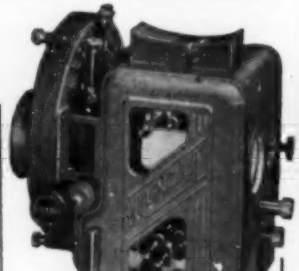

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SCREEN TYPES

(Continued from page 6)

ous disadvantage, too. Every tiny dent, wave, or wrinkle in the screen is very conspicuous. Beaded screens are much less bothersome in this respect.

Reflecting Angles

Aluminized screens reflect most of the light rays at an angle which is equal and opposite to the angle formed by the incident rays. In other words, these screens have a pronounced tendency to reflect light in somewhat the same manner as ordinary flat mirrors. For this reason aluminized screens should not be used in theaters having steep projection angles. If the projectors are directed downward at an angle of 20 degrees to a perpendicular extended from the center of the screen, most of the light reflected will pour down into the front rows of seats. Patrons occupying other seats will not be able to see a sufficiently bright picture.

Beaded screens, although specular, direct most of the light back along the same path from which it came. When steep projection angles are used with beaded screens, patrons in the balconies, not those seated down front in the orchestra, will see the brightest picture.

As a rule, theaters having steep projection angles and high balconies, and those having seats outside a 25 or 30 degree viewing angle from the normal, should avoid the use of specular screens. And they should never in any case be considered as substitutes for H.I. arc-lamps.

The average theater auditorium, therefore, requires the matte type of screen.

Surface Texture

The fourth important characteristic of screens is the texture of the reflecting surface. As a rule, the surface of the matte screen should be hard and reasonably smooth, though not so smooth as calendered cardboard. Unsatisfactory projection may result if the screen surface is of a very loosely woven, fuzzy, or felt-like texture.

The effect of different textures on the appearance of focused images may be demonstrated in the following way:

Using an ordinary magnifying or reading glass, focus the image of a distant object—a building visible through an open window, for example—upon the hard, smooth surface of a white card. Note the clarity of the image and the fine detail which may be present in the inverted image.

Now substitute for the card a cotton handkerchief. Observe that the finest detail is lost, and that the image is not so sharp as it was on the card. Repeat with a coarser material such as white felt or white woolen material. It will at once be seen that pictorial detail and contrast values have seriously deteriorated. The loose fibers scatter light through the material and fog the focus.

Light Scattering Phenomena

The same light-scattering phenomena would occur if motion pictures were projected upon cotton sheeting, uncoated white canvas, etc. Not only is light lost by passing through the interstices of a loosely woven material, but internal reflections produce a fog which reduces the resolving power of the projection lens. If several thickness of ordinary sheeting are used in an attempt to reduce the loss of light by transmission, the projected picture, although brighter, looks even more hazy.

Some scattering of light is always involved in the beaded type of specular screen; but since the magnitude of this effect remains the same on screens of all sizes (provided that the size of the beads is the same), no fogging is visible on theater-size beaded screens. But with the very smallest beaded screens intended for non-professional 16-mm projections, the loss of contrast values in fine detail is quite noticeable.

Matte Surface Screens

The standard matte screen, whether of the painted canvas or the plastic type, has good diffusibility and high reflectivity (about 80% for a solid and 72% for a perforated screen). The reflected light is accordingly practically uniform at all angles from the normal to 70 degrees. A slight fade-off beyond 70 degrees is quite unimportant, since no projected picture can be seen in proper perspective from viewing angles greater than 45 degrees.

Much has been written on the deterioration of the reflective power of screen surfaces with age. The factors involved are so variable and uncertain when we stop to consider how many different types of screens there are and how many different local conditions exist, that it is impossible to give definite figures on reflection losses due to aging. Some loss is undoubtedly occasioned by dust and dirt which settles on the screen and becomes imbedded in the surface. Some is also due to darkening and yellowing of the glues, resins, and other substances which serve to bind the coating and prevent it from flaking off. Many plastics discolor with age; but it is believed that the newer plastic screens are comparatively free from this drawback. All screens darken rapidly in theaters where smoking is permitted, for the tars present in tobacco smoke condense on the screen to form a yellow-brown film which adheres like varnish.

Most of the screen pigments used at

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the present time are chemically stable, and therefore not liable to discolor or darken because of oxidation or reaction with coal gas and other sulfurous fumes. Magnesium carbonate is the whitest of all pigments, but it has rather poor covering power, permitting some of the light to pass through it. Titanium dioxide and zinc oxide (zinc white) have better covering power, though lower reflectivity, especially of the violet and blue rays (which means that they are actually very faintly yellowish). White lead is inferior; and its use in screens is definitely contraindicated by the fact that it turns quickly and permanently brown upon exposure to coal gas.

Diffusing Surfaces

One of the very whitest and most permanent screen surfaces is obtained as follows: An undercoat of bright aluminum lacquer is first applied to sized canvas. Next, two coats of flat titanium and zinc white paint are applied. Finally, three or four coats of a non-gloss vinyl acetate lacquer containing magnesium carbonate are sprayed on. This screen may be washed with soapy water, when necessary, and restored to original brilliance by repainting with one coat of the magnesium carbonate lacquer.

In the days of silent pictures it was not unusual to find screens made of plasterboard in many of the smaller theaters. These were freshly kalsomined (reflectivity 65%) whenever sullied by wads of chewing gum, overripe fruit, and other missiles hurled at movie villains from the front rows. Although such screens served admirably in their day, it is obvious to everyone that their day is over. Kalsomine is no longer considered suitable for screen surfacing.

Can a modern perforated screen be restored by recoating? The older type of matte sound screen may be at least partially restored by spraying with special screen-surfacing preparations, but it is difficult to avoid plugging up the sound holes or reducing their size. In any event, painting screens is not properly a duty of projectionists. Screen resurfacing specialists should always be consulted whenever such work is contemplated.

Beaded Surfaces

Beaded screens cannot be resurfaced; and most modern plastic screens are not intended to be repainted in the theater. As a rule, such screens last for many years with judicious cleaning, but no screen can be considered absolutely permanent. These screens should be replaced with new ones when their condition falls below par.

In most theaters, however, it is the chief projectionist's duty to inspect the screen, have it cleaned whenever necessary, and to report evidences of damage to the management. In practically all theaters except those in very smoky cities, the high reflective power of a new plastic matte screen can be maintained for a very long time by proper screen care. A drop in reflective power from 72% to 68.4% within a year is not so alarming as it may seem. This decrease amounts to only 5%, a brightness difference which can just barely be discerned, and only by side-by-side comparison. And the chances are that brushing or cleaning the screen will restore at least 2% of the reflectivity, and that the percentage of loss per month or per year will not increase with the passage of time.

Incorrect cleaning of screens, however, can be ruinous. The dust which collects on the surface of the screen and accumulates around the edges of the sound holes often consists of hard, jagged particles. Vigorous rubbing of the screen with a cloth or stiff brush serves only to embed the dirt to such an extent that it can never be removed, thus lowering both reflective power and the original uniformity of the reflecting surface. An abused screen usually has a streaked appearance.

Cleaning the Screen

Before brushing the front of the screen, it is a good idea to go over the back with a vacuum cleaner if the speaker assemblies can be temporarily moved out of the way. Suction from the back will remove dirt from the perforations and prevent it from streaking the front.

Then brush the entire surface of the front of the screen *gently* with a wide *soft-bristled* brush attached to a long handle. Brush the top half of the screen first, using a firm step-ladder for support. Brush with downward strokes only. Finally, brush the lower half of the screen with the same vertical strokes.

Always keep the screen brush dust-free at all times, and wrap it in a clean cloth when not in use.

It helps the screen in any theater to keep the stage curtains closed while janitors are cleaning the auditorium.

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